

AN INVESTIGATION OF COGNITIVE AND METACOGNITIVE STRATEGY USE: CHANGES AND DIFFERENCES

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Abstract

This paper reports on the results of a study of the use of cognitive and metacognitive strategies in English learning in terms of changes and differences during a term at the tertiary level in Chinese EFL contexts. A 35-item survey involving 934 undergraduate non-English majors revealed that: (1) the whole participant sample, as well as males and females, reported a low use of the cognitive strategies of practicing and creating structure for input and output but generally a medium use of the other cognitive and metacognitive strategies both at the beginning and toward the end of the term; (2) towards the end of the term, the whole sample, as well as males and females and the three university samples, tended to utilize significantly more frequently most of the cognitive and metacognitive strategies but less frequently the strategies of centering one's learning; (3) significant differences occurred in the strategies of creating structure for input and output, centering one's learning, and evaluating one's learning between male and female students at the beginning and/or toward the end of the term, and in almost all the categories of cognitive and metacognitive strategies among the three university samples both at the beginning and toward the end of term; (4) the three university samples demonstrated differing patterns in using the cognitive and metacognitive strategies both at the beginning and toward the end of term. Based on the results, some implications and suggestions for future research are discussed.

Keywords: Strategy use, cognitive, metacognitive, change, gender; context.

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INTRODUCTION

Extensive research has explored language learning strategy use among learners of English as a second/foreign language and students of various backgrounds learning other languages such as Japanese, Spanish and Russian (Gu & Johnson, 1996; Magogwe & Oliver, 2007; O'Malley & Chamot, 1990; Oxford, 1990; Zhang & Liu, 2008). The present study extends this work on learning strategies to Chinese first-year university students. The study uses survey to reveal differences and changes in the use of cognitive and metacognitive strategies by the students over a term.

LITERATURE REVIEW

Numerous studies show that the use of language learning strategies is closely related to learning outcomes: more successful language learners tend to use more good language learning strategies and choose the strategies more appropriate to a certain language task (Abraham & Vann, 1987; Bremner, 1999; Grainger, 2005; Gu & Johnson, 1996; Magogwe & Oliver, 2007; Naiman, Frühlich, Stern & Todesco, 1978; Wang, 2007; Zhang & Liu, 2008).

As research on language learning strategy use flourishes, various definitions and classifications of language learning strategies have been advanced, with the core concept being that language learning strategies must be something that learners consciously select in order to accomplish language tasks and that language learning strategy use involves some degree of consciousness, awareness, and intentionality (Cohen, 1998; O'Malley & Chamot, 1990; Oxford, 1990; Lan & Oxford, 2003; Wen, 1993, 1995, 1996). Grouped into various categories, cognitive and metacognitive strategies have always been agreed to be indispensable components of language learning strategies (O'Malley, Chamot, Stewner-Manzanares, Kupper & Russo, 1985; Oxford, 1990; Wong-Fillmore, 1979). According to Oxford (1990), cognitive strategies are "unified by a common function: manipulation or transformation of the target language by the learner" (e.g., 'I use the English words I know in different ways') (p. 43); and metacognitive strategies "allow learners to control their own cognition" (e.g., 'I look for people to talk to in English') (p. 135).

The types of language learning strategies used by different learners may vary according to various variables such as motivation, cultural background, task type, age, L2 proficiency, learning style, and gender (Gao, 2006; Grainger, 1997, 2005; Magogwe & Oliver, 2007; Oxford, 1989; Skehan, 1989). Based on 34 interviews with successful language learners, Naiman et al. (1978) identified a set of five major strategies such as active

task approach and realization of language as a system, with each major strategy associated with a number of minor and more specific substrategies (e.g., analyzing the target language and make inferences about it, and displaying critical sensitivity to language use, for example, by attempting to find out socio-cultural meanings). Based on data collected via survey and self-ratings, Oxford and Nyikos (1989) found that students' self-rated proficiency in speaking, listening, or reading was positively related to their frequency of strategy use and that greater strategy use was accompanied by self-perceptions of higher proficiency. The study also revealed that females reported using strategies far more often than did males in formal rule-related practice, general study strategies, and conversational input elicitation strategies. Ehrman and Oxford (1995) also discovered significant gender differences in strategy use, but the differences lied in general study strategies, strategies for authentic language use, strategies for searching for and communicating meaning, and metacognitive or self-management strategies. In order to describe the patterns of variation in overall strategy use and strategy use of different categories by male and female students at three different proficiency levels, Green and Oxford (1995) administered a survey to 374 prebasic, basic, and intermediate English level students at an American University. The results were (1) the prebasic-level students used significantly less strategies than the other two level students, (2) females used more strategies than males, and (3) proficiency level had a significant effect on the cognitive, compensation, metacognitive, and social strategies.

By interviewing secondary-school ESL learners and their teachers and observing them, O'Malley et al. (1985) identified nine metacognitive and sixteen cognitive strategies. They also discovered that better learners tended to use a greater proportion of metacognitive strategies, while the beginning level learners were more concerned with the actual handling of data and direct learning processes. This finding was largely confirmed by subsequent studies (Chamot & El-Dinary, 1999; Chamot & Küpper, 1989; Hong-Nam & Leavell, 2006; Vandergrift, 1996). In order to investigate the relationship between listening strategy use and language proficiency, Vandergrift (1996, 1997) targeted novice-level and intermediate-level high school learners of French by way of structured interviews, stimulated recall and think-aloud protocols. Analyses of structured interviews (Vandergrift, 1996) revealed that the number of total strategies as well as the number of distinct metacognitive strategies increased by course level and that females tended to report a greater number of metacognitive strategies than their male peers. Think-aloud protocols (Vandergrift, 1997) uncovered that novice-level listeners heavily relied on elaboration, inferencing, and transfer and overcame their limited knowledge of French by using cognates and

extralinguistic clues such as sound effects to construct meaning of a text. The researcher argued that the constraints on processing at the novice level were so great that there was little attentional room for metacognitive strategies such as monitoring. By contrast, intermediate-level listeners were able to process larger chunks of information and employed over twice as many metacognitive strategies as their novice-level peers. This finding was further supported by Peters' (1999) study which also discovered that the more skilled listeners were the more successful in linguistic inferencing and engaged in less elaboration.

RESEARCH QUESTIONS

As reviewed above, the use of language learning strategies (particularly cognitive and metacognitive strategies) and its relationship with second/foreign language learning outcomes, as well as other variables, have been the focus of a huge body of research over the past decades. Needless to say, language learning strategy use contributes to SL/FL learning. Nevertheless, do language learners use the same strategies all the time? If no, how different could it be? And how different could it be to male and female students, and to more proficient and less proficient learners? To answer these questions, the present study was situated in Chinese EFL learning contexts at the tertiary level and the following questions were of particular interest:

- (1) Is there any change in cognitive and metacognitive strategy use by Chinese undergraduate non-English majors over a term?
- (2) Is there any difference in cognitive and metacognitive strategy use between male and female students?
- (3) Is there any change in cognitive and metacognitive strategy use in males and females over the term?
- (4) Is there any difference in cognitive and metacognitive strategy use among students from different learning contexts?
- (5) Is there any change in cognitive and metacognitive strategy use in each university sample over the term?

RESEARCH DESIGN

This paper reports part of a longitudinal investigation of changes in and interaction of learner factors and their effect on the learning of English.

Participants. The participants were 934 (587 male and 347 female) first-year non-English majors from various disciplines such as Law,

Engineering, Mechanics and Economics and Management at three universities in China. All were enrolled in credit-bearing and compulsory English courses offered by their universities. With an age range from 13 to 21 and an average age of 18.49, the majority (451/48.3%) of the participants aged 18, followed by the group aged 19 (315/33.7%), and then came the groups aged 20 (97/10.4%) and 17 (53/5.7%).

TABLE 1
 Information About the Participants (N = 934)

TU (366/39.2%)		BUU (245/26.2%)		HUT (323/34.6%)		Total (934/100%)	
M	F	M	F	M	F	M	F
264	102	79	166	244	79	587	347
72.1%	27.9%	32.2%	67.8%	75.5%	24.5%	62.8%	37.2%

Instrument. For this study, the students completed a survey consisting of a 19-item Cognitive Strategy Use Questionnaire, a 16-item Metacognitive Strategy Use Questionnaire, and the background questionnaire, as detailed below. All the items except the background questionnaire were placed on a 5-point Likert scale ranging from ‘Always or almost always used’ to ‘Never or almost never used’ with values 1-5 assigned to the descriptors respectively.

The survey. In the present study, both the Cognitive Strategy Use Questionnaire (CSUQ) and the Metacognitive Strategy Use Questionnaire (MSUQ) were adapted from the Strategy Inventory for Language Learning developed by Oxford (1990). To better fit the present situation, five more items were added to the CSUQ and seven more items to the MSUQ respectively, with reference to the English Learning Strategy Use Questionnaire self-developed by Liu and Zhang (2009).

The added CSUQ items were: I listen to/watch an English episode repeatedly until I understand every word (item 1) since this is often the way Chinese EFL learners try to learn the language better due to the lack of exposure and access to English; when looking up an English word in a dictionary, I not only make sure of its meaning but learn how to use it (item 9); I pay attention to the difference between Chinese and English when learning English (item 13); I transfer my knowledge about learning Chinese to English-learning (item 16); and I take notes while learning (item 19). The case is often that most Chinese undergraduate EFL learners have an electronic dictionary (but few have a paper dictionary) to turn to when encountering an unfamiliar English word. The problem is that the students

will just find the meaning of a word they need and stop proceeding to learn how to use the word. For this reason, item 9 was added. Items 13 and 16 were added because of the nature of the participants' native and target languages. Item 19 was added because many Chinese students have developed/kept the habit of taking notes when learning something.

The added MSUQ items were: when learning/using English, I often try to link it with what I have known (item 20); I focus on listening first and start to speak English later (item 22); I identify the purpose of an English-learning task first (item 26); I select different learning strategies according to different tasks (item 27); I select English learning materials based on my English proficiency (item 28); I test myself on English materials (item 33); and I make adjustment once I find some strategies are of little effect when learning English (item 34). These items were added because the means were fairly high for all participants (1203) and/or for advanced-level learners (451) in Liu and Zhang's (2009) study, thus resulted in the present 19-item Cognitive Strategy Use Questionnaire (CSUQ) and 16-item metacognitive Strategy Use Questionnaire (MSUQ). With Oxford's (1990) classification as the base model, this 19-item CSUQ ($\alpha = .796/.819$ in Phases 1 & 2 respectively) intended to measure four dimensions of cognitive strategy use: practicing, receiving and sending messages, analyzing and reasoning, and creating structure for input and output; and the 16-item MSUQ ($\alpha = .862/.8796$ in Phases 1 & 2 respectively) sought to measure three dimensions of metacognitive strategy use: centering one's learning, arranging and planning and evaluating one's learning.

Background information. The background questionnaire aimed to gather the respondents' demographic information such as name, gender, department, university, and English-learning time.

Procedure. The survey, together with other questionnaires, was administered to 30 intact classes of first-year undergraduate non-English majors at three universities during the first 16-week term of Academic Year 2007-2008. The survey was completed in around 7 minutes in a normal period of class during the 3rd week (Phase 1) and 14th week (Phase 2) of the term. Of 1,121 collected questionnaires, 934 were completed in both Phases for further statistical analyses (others were discarded because of incompleteness).

Data analysis. For each measure, the mean, standard deviation, median, mode, and score range were calculated to determine how frequently the students used the strategies when learning English. Then, independent samples t-tests were run to explore the difference in cognitive and metacognitive strategy use between male and female students; and one-way

ANOVA (Duncan's) was conducted to tap the difference in cognitive and metacognitive strategy use among the three university samples. Finally paired samples t-tests were conducted to reveal the changes in cognitive and metacognitive strategy use of the whole participant sample and various subsamples over the term.

RESULTS AND DISCUSSION

Broad Profile of and Changes in Cognitive and Metacognitive Strategy Use

To reveal the broad profile of and changes in cognitive and metacognitive strategy use over the term, the means, standard deviations, medians, modes, maximums, and minimums of the CSUQ, the MSUQ and their subscales were computed. The total score of the CSUQ/MSUQ revealed a respondent's use range of cognitive/metacognitive strategies; the higher the score, the more frequently the respondent reportedly used the strategies.

For the 19-item CSUQ, a total score of more than 95 implied a high use of the cognitive strategies in English learning, a total score of 57 to 76 signified a medium use, and a total score of less than 57 indicated a low use. Similarly, a total score of more than 24 for the 6-item CSUQ1 suggested a high use of practicing, a total score of 18 to 24 indicated a medium use, and a total score of less than 18 reflected a low use. For the 3-item CSUQ2 and CSUQ4, the score ranges for a high, medium and low use of receiving and sending messages (CSUQ2) and creating structure for input and output (CSUQ4) respectively were: more than 12, 9-12, and less than 9. The score ranges for a high, medium and low use of analyzing and reasoning for the 7-item CSUQ3 were: more than 28, 21-28 and less than 21 respectively. The results are summarized in Table 2.

Likewise, a total score of more than 64 on the 16-item MSUQ suggested a high use of the metacognitive strategies in English learning, a total score of 48 to 64 signified a medium use, and a total score of less than 48 indicated a low use. For the 4-item MSUQ1/MSUQ3, a total score of more than 16 indicated a high use of centering one's attention/evaluating one's learning, a total score of 12 to 16 was implicative of a medium use, and a total score of less than 12 reflected a low use. For the 8-item MSUQ2, the score ranges for a high, medium and low use of arranging and planning one's learning respectively were: more than 32, 24-32, and less than 24. The results are reported in Table 2.

TABLE 2
Statistical Analyses of the Cognitive and
Metacognitive Strategy Use Questionnaires (N = 934)

		Frequency of strategy use				
		Mean/range	Standard deviation	Median	Mode	Range
CSUQ1	1 st	17.44/low use	3.90	17	17	6-30
	2 nd	17.94/low use	3.89	18	18	6-30
CSUQ2	1 st	9.31/medium use	2.42	9	9	3-15
	2 nd	9.58/medium use	2.14	10	10	3-15
CSUQ3	1 st	21.78/medium use	3.83	22	20	9-35
	2 nd	22.4/medium use	3.94	22	21	7-35
CUSQ4	1 st	8.12/low use	2.01	8	8	3-15
	2 nd	8.25/low use	2.13	8	8	3-15
CSUQ	1 st	56.65/low use	9.18	56	57	24-93
	2 nd	58.17/medium use	9.21	58	60	20-95
MSUQ1	1 st	14.72/medium use	2.48	15	16	4-20
	2 nd	14.38/medium use	2.55	15	16	4-20
MSUQ2	1 st	23.72/low use	5.31	24	24	8-40
	2 nd	24.12/medium use	5.16	24	24	8-40
MSUQ3	1 st	12.85/medium use	2.7	13	12	4-20
	2 nd	12.82/medium use	2.68	13	12	4-20
MSUQ	1 st	51.29/medium use	8.72	51	49	16-80
	2 nd	51.32/medium use	8.78	51	50	16-80

Notes: 1st = Phase 1; 2nd = Phase 2

As shown in Table 2, the actual score range for the CSUQ for the present study was 24 to 93 in Phase 1 and 20 to 95 in Phase 2, with a mean of 56.65 (SD = 9.18) in Phase 1 and 58.17 (SD = 9.21) in Phase 2. This result, coupled with the CSUQ median (56 and 58 in Phases 1 and 2 respectively) and mode (57 and 60 in Phases 1 and 2 respectively), all (nearly) exceeding the scale midpoint 57 but falling below 76, indicates a medium use of the cognitive strategies by the participants in English learning both at the beginning and toward the end of the term. CSUQ1 had a

mean of 17.44 in Phase 1 and 17.94 in Phase 2, a median and mode of 17 in Phase 1 and 18 in Phase 2, almost all slightly below the scale midpoint 18, indicating a low use to the upper end of practicing strategies both at the beginning and toward the end of the term. CSUQ2 had a mean of 9.31 in Phase 1 and 9.58 in Phase 2, a median and mode of 9 in Phase 1 and 10 in Phase 2; CSUQ3 means were 21.78 and 22.4 in two Phases respectively, with a median of 22 and a mode of 20 in Phase 1 and 22 and 21 in Phase 2. Apparently, both CSUQ 2 and CSUQ 3 scores exceeded their scale midpoints 9 and 21 respectively. Namely, the participants had a medium use of the cognitive strategies of receiving and sending messages, and analyzing and reasoning both at the beginning and toward the end of the term. The means for CUSQ4 in both Phases were 8.12 and 8.25 respectively, with a median and mode of 8 in both Phases as well, suggesting a low use of the strategies of creating structure for input and output both at the beginning and toward the end of the term. These findings further confirm the result of the CSUQ data, partially consistent with what was found in Purpura's (1997) and Zhang and Liu's (2008) studies about the use of cognitive and metacognitive strategies in English tests.

With a possible and actual range of 16 to 80 in both Phases, the MSUQ had a mean of 51.29 (SD = 8.72) in Phase 1 and 51.32 (SD = 8.78) in Phase 2, a median of 51 and a mode of 49 in Phase 1 and 51 and 50 in Phase 2, all of which were larger than the scale midpoint 48 but smaller than 64, reflecting a medium use of the metacognitive strategies by the correspondents in English learning in both Phases. Meanwhile, MSUQ1 had a mean of 14.72 in Phase 1 and 14.38 in Phase 2, a median of 15 and a mode of 16 in both Phases; MSUQ2 had a mean of 23.72 in Phase 1 and 24.12 in Phase 2, a median and mode of 24 in both Phases; MSUQ3 means were 12.85 and 12.82 in Phases 1 and 2 respectively, with a median of 13 and a mode of 12 in both Phases. Clearly, nearly all the MSUQ subscale scores (slightly) exceeded their scale midpoints (12, 24 and 12 for MSUQ1, MSUQ2 and MSUQ 3 respectively). Alternatively, the learners reported having a medium use of the strategies of centering attention and evaluating learning in both Phases, a low but a medium use of the strategies of arranging and planning in Phases 1 and 2 respectively, as found about the participants during an English test in Purpura's (1997) and Zhang and Liu's (2008) studies.

Meanwhile, as seen from Table 2, the students generally tended to score higher on the CSUQ, the MSUQ and their subscales but lower on MSUQ1 and MSUQ3 in Phase 2, implying that they became more frequent users of the cognitive strategies of various categories and the metacognitive strategies of arranging and planning but less frequent users of the strategies

of centering and evaluating one's learning. And all the differences except those in CSUQ4, MSUQ3 and the MSUQ were statistically significant, as evidenced by the paired samples t-test results summarized in Table 3, that is, the respondents tended to utilize significantly more frequently the strategies of practicing, receiving and sending messages, analyzing and reasoning, arranging and planning one's learning, and the overall cognitive strategies, but less frequently the strategies of centering one's learning toward the end of the term.

TABLE 3
Paired Samples T-test Results of
Differences in the CSUQ, the MSCU and Their Subscales (N= 934)

	df	t	p
CSUQ1	933	4.01	.000
CSUQ2	933	3.58	.000
CSUQ3	933	4.64	.000
CSUQ4	933	1.70	.089
CSUQ	933	5.42	.000
MSUQ1	933	-3.98	.000
MSUQ2	933	2.65	.008
MSUQ3	933	-.42	.678
MSUQ	933	.12	.906

Gender Differences and Changes in Cognitive and Metacognitive Strategy Use

To explore gender differences and changes in cognitive and metacognitive strategy use required the computation of the means, standard deviations, medians, modes, minimums and maximums of the CSUQ, the MSUQ and their subscales for both males and females. The results are presented in Table 4.

TABLE 4
 Gender Differences in the CSUQ, the MSUQ and Their Subscales

		Mean/range		Standard deviation		Median		Mode		Range	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
CSU	1 st	17.30	17.66	3.91	3.89	17	18	16	18	6-30	6-30
	Q1	17.90	17.99	3.89	3.90	18	18	18	18	6-30	6-30
CSU	1 st	9.33	9.29	2.39	2.48	9	9	8	9	3-15	3-15
	Q2	9.53	9.66	2.10	2.20	9	10	10	10	3-15	3-15
CSU	1 st	21.92	21.55	3.84	3.81	22	22	23	20	9-35	11-35
	Q3	22.49	22.25	3.90	3.995	22	22	21	22	7-35	7-35
CSU	1 st	7.90	8.51	2.03	1.90	8	8	8	8	3-15	3-15
	Q4	7.98	8.71	2.11	2.10	8	8	8	8	3-15	3-15
CSU	1 st	56.44	57	9.20	9.15	56	57	57	56	24-92	26-93
	Q	57.91	58.62	9.11	9.39	58	58	60	57	20-95	30-95
MSU	1 st	14.52	15.05	2.56	2.32	15	15	16	16	4-20	7-20
	Q1	14.21	14.67	2.55	2.54	15	15	16	16	4-20	5-20
MSU	1 st	23.75	23.67	5.33	5.27	24	23	24	24	8-40	12-40
	Q2	24.13	24.11	5.20	5.08	24	24	23	24	8-40	11-40
MSU	1 st	13.04	12.54	2.70	2.69	13	12	12	12	4-20	4-20
	Q3	12.92	12.64	2.65	2.72	13	12	12	12	4-20	4-20
MSU	1 st	51.32	51.25	8.71	8.74	51	50	49	50	16-77	24-80
	Q	51.26	51.42	8.81	8.75	51	51	50	47	16-80	28-80

Notes: 1st = Phase 1; 2nd = Phase 2

Table 4 shows that both male and female students, like the whole sample, shared a similar pattern of using the cognitive and metacognitive strategies when learning English in both Phases: both groups reported having a medium use of the strategies of receiving and sending messages (CSUQ2), analyzing and reasoning (CSUQ3), centering (MSUQ1) and evaluating (MSUQ3) one's learning, and the overall cognitive (CSUQ) and metacognitive (MSUQ) strategies in both Phases; both had a low use of the strategies of practicing (CSUQ1) and creating structure for input and output (CSUQ4) in both Phases; and both had a low use of the strategies of arranging and planning one's learning (MSUQ2) in Phase 1 but a medium use of them in Phase 2.

In addition, comparison of male and female scores in both Phases reveals that females scored higher on CSUQ1, CSUQ4, the CSUQ, and MSUQ1 but lower on CSUQ3, MSUQ2 and MSUQ3 than their male peers in both Phases. They also scored lower on CSUQ2 and MSUQ in Phase 1 but higher on them in Phase 2 than their male counterparts. In general, it seems that female students were more frequent users of both cognitive and metacognitive strategies in English learning both at the beginning and toward the end of the term. Nevertheless, significant difference was observed only in CSUQ4 ($t = -4.55$ and -5.17 for Phases 1 & 2 respectively, $p = .000$) and MSUQ1 ($t = -3.14$, and -2.70 for Phases 1 & 2 respectively, $p < .01$) in both Phases, and in MSUQ3 ($t = 2.78$, $p = .006$) in Phase 1, as supported by the independent samples t-test results shown in Table 5. Alternatively, female students reported having a significantly more frequent use of the strategies of creating structure for input and output (CSUQ4) and centering one's learning (MSUQ1) in both Phases, yet a significantly less frequent use of the strategies of evaluating one's learning (MSUQ3) in Phase 1. This result is largely consistent with that found in many existing studies situated in other EFL/ESL contexts (Chavez, 2001; Green & Oxford, 1995; Vandergrift, 1997; Wen & Johnson, 1997) as well as that in Li's (2005) study which aimed to investigate the pattern of learning strategy use of undergraduate non-English majors and its relationship with the students' English proficiency in a similar Chinese EFL context. Meanwhile, this finding contradicts that revealed in many other studies (Boyle, 1987; Scarella & Zimmerman, 1998), yet, it suggests that some strategies are gender-related and that gender-based differences in strategic behavior might reside at the level of specific strategies, as Young and Oxford (1997) claimed.

TABLE 5
 Independent Samples T-test Results of Gender
 Difference in the CSUQ, the MSUQ and Their Subscales (N = 934)

		CSUQ1	CSUQ2	CSUQ3	CSUQ4	CSUQ	MSUQ1	MSUQ2	MSUQ3	MSUQ
1 st	t	-1.34	.255	1.42	-4.55	-.893	-3.14	.238	2.78	.114
	p	.179	.799	.155	.000	.372	.002	.812	.006	.909
2 nd	t	-.353	-.883	.928	-5.17	-1.14	-2.70	.075	1.56	-.26
	p	.724	.378	.353	.000	.255	.007	.940	.120	.792

Note: The degree of freedom for both phases were 932; 1st = Phase 1; 2nd = Phase 2

Moreover, comparison of the two sets of scores shows that males scored higher on each scale in Phase 2 except on MSUQ1, MSUQ3 and the MSUQ, while females achieved a lower score on MSUQ1 but a higher score on all the other scales. Evidently, toward the end of the term, males became more frequent users of the cognitive strategies of various categories and the metacognitive strategies of arranging and planning but less frequent users of the metacognitive strategies of centering and evaluating one's learning and the overall metacognitive strategies; and females became more frequent users of all the strategies except those of centering one's learning. And significant differences occurred in CSUQ1, CSU2, CSUQ3, the CSUQ, and MSUQ1 for males and in CSUQ2, CSUQ3, the CSUQ, and MSUQ1 for females, as supported by the paired samples t-test results presented in Table 6.

TABLE 6
 Paired Samples T-test Results of Changes in the
 CSUQ, the MSCUQ and Their Subscales for Both Males and Females

		CSUQ1	CSUQ2	CSUQ3	CSUQ4	CSUQ	MSUQ1	MSUQ2	MSUQ3	MSUQ
M	df	586	586	586	586	586	586	586	586	586
	t	3.65	2.13	3.34	.835	3.92	-2.85	1.895	-1.03	-.169
	p	.000	.034	.001	.404	.000	.004	.059	.303	.866
F	df	346	346	346	346	346	346	346	346	346
	t	1.77	3.19	3.30	1.76	3.91	-2.86	1.93	.746	.470
	p	.078	.002	.001	.079	.000	.005	.054	.456	.639

Note: M = male (N = 587); F = female (N = 347)

Differences and Changes in Cognitive and Metacognitive Strategy Use Among Students in Different Learning Contexts

In order to examine the differences and changes in cognitive and metacognitive strategy use among students from different learning contexts, one-way ANOVA (Duncan's) was conducted (see Table 7).

TABLE 7
ANOVA Results of the CSUQ, the MSUQ and Their Subscales

Measures	df	F	P	Level (Mean)			Location of Sig. difference	
				TU = 366; BUU = 245; HUT = 323				
				TU	BUU	HUT		
1 st	CSUQ1	2	11.43	.000	18.17	16.78	17.11	TU & BUU; TU & HUT
	CSUQ2	2	16.72	.000	9.83	8.71	9.18	All
	CSUQ3	2	4.76	.009	22.23	21.30	21.63	TU & BUU
	CSUQ4	2	5.17	.006	8.11	8.44	7.90	BUU & TU; BUU & HUT
	CSUQ	2	10.67	.000	58.34	55.82	55.23	TU & BUU; TU & HUT
	MSUQ1	2	16.34	.000	15.20	14.06	14.66	All
	MSUQ2	2	5.14	.006	24.37	23.02	23.51	TU & BUU; TU & HUT
	MSUQ3	2	11.96	.000	13.14	12.14	13.07	BUU & TU; BUU & HUT
	MSUQ	2	12.06	.000	52.71	49.22	51.25	All
2 nd	CSUQ1	2	13.88	.000	18.78	16.66	17.35	TU & BUU; TU & HUT
	CSUQ2	2	11.23	.000	9.98	9.10	9.19	TU & BUU; TU & HUT
	CSUQ3	2	4.91	.008	22.90	21.35	22.42	BUU & TU; BUU & HUT

	CSUQ4	2	2.43	.089	8.19	7.81	7.80	/
	CSUQ	2	12.70	.000	59.86	54.92	56.76	TU & BUU; TU & HUT
	MSUQ1	2	21.04	.000	14.58	12.56	14.34	BUU & TU; BUU & HUT
	MSUQ2	2	5.51	.004	24.91	23.37	23.54	TU & BUU; TU & HUT
	MSUQ3	2	6.24	.002	13.08	11.95	13.06	BUU & TU; BUU & HUT
	MSUQ	2	9.18	.000	52.57	47.87	50.94	BUU & TU; BUU & HUT

Notes: 1st = Phase 1; 2nd = Phase 2

As noted from Table 7, the TU learners reported a medium use of all the strategies but a low use of those of creating structure for input and output (CSUQ4) in both Phases; the BUU students had a low use of the strategies of practicing (CSUQ1), creating structure for input and output (CSUQ4), arranging and planning (MSUQ2), and the overall cognitive strategies in both Phases, a low use of the strategies of sending and receiving messages (CSUQ2) in Phase 1 and of practicing (CSUQ1), evaluating one's learning (MSUQ3), and the overall metacognitive strategies in Phase 2, and a medium use of other strategies in both Phases; the HUT respondents displayed a low use of the strategies of practicing (CSUQ1), creating structure for input and output (CSUQ4), arranging and planning (MSUQ2), and the overall cognitive strategies in both Phases, and a medium use of the other strategies in both Phases. Possibly because of the different patterns revealed by the three samples, the whole sample generated an overall pattern in using the cognitive and metacognitive strategies unlike that of any of the three university groups.

Comparison of the scores on each scale across universities in both Phases exposes that the BUU learners scored the highest on CSUQ4 and the lowest on all the other scales but the CSUQ in Phase 1, and the lowest on all the scales except CSUQ4 in Phase 2. Table 7 also shows that the TU students achieved the highest scores on all the scales in both Phases except on CSUQ4 in Phase 1. Seemingly, in both Phases, the TU respondents reported using the strategies most frequently while their BUU peers employed them almost the least often.

The post hoc tests show that significant differences existed among the university samples in all scales in both Phases except CSUQ4 in Phase 2. Except that the three samples significantly differed from one another in CSUQ2, MSUQ1, and the MSUQ in Phase 1, the significant differences mainly occurred between the BUU and the other two samples or between the TU and the other two samples on the other scales in both Phases. Generally, the BUU respondents utilized significantly more frequently the strategies of creating structure for input and output (CSUQ4) yet significantly less frequently the strategies of sending and receiving messages (CSUQ2), centering (MSUQ1) and evaluating (MSUQ3) one's learning than their TU and HUT counterparts in Phase 1, and significantly less frequently the strategies of analyzing and reasoning (CSUQ3), centering (MSUQ1) and evaluating (MSUQ3) one's learning, and the overall metacognitive strategies than the other two samples in Phase 2. Meanwhile, the TU learners deployed significantly more frequently the strategies of practicing (CSUQ1), sending and receiving messages (CSUQ2), centering (MSUQ1) one's learning, arranging and planning (MSUQ2), and the overall cognitive strategies than their BUU and HUT peers in both Phases, and the overall metacognitive strategies in Phase 1. Apart from that, the TU students reported to be significantly more frequent users of the strategies of analyzing and reasoning than their BUU peers in Phase 1.

Apparently, the students at the highest English proficiency level (the TU) tended to use significantly more cognitive and metacognitive strategies than did the least proficiency students (the BUU), as found in numerous existing studies (Abraham & Vann, 1987; Bremner, 1999; Gu & Johnson, 1996; Li, 2005; Vandergrift, 1996, 1997; Wang, 2007) though different from Hong-Nam and Leavell's (2006) finding.

Table 7 also shows that the three samples reported slightly differently on the scales in Phase 2 compared with their reports in Phase 1: the TU sample tended to score lower on MSUQ3 and the MSUQ but higher on the other scales in Phase 2; the BUU learners achieved a lower score on CSUQ1, CSUQ4, the CSUQ, MSUQ3 and the MSUQ but higher on the other scales; and the BUT participants scored lower on CSUQ4 and the MSUQ but higher on the other scales in Phase 2. And the differences on all scales except on MSUQ3 and the MSUQ for the TU participants were statistically significant; while significant difference only occurred on MSUQ1 for the BUU sample and on CSUQ3 and the CSUQ for the HUT learners. Namely, toward the end of the term, the TU students became significantly more frequent users of all the cognitive strategies ($t = 4.01, 3.14, 2.87, 2.13, \text{ and } 4.48$ for CSUQ1, CSUQ2, CSUQ3, CSUQ4 and the

CSUQ respectively, $p < .05$) and the metacognitive strategies of arranging and planning ($t = 3.13$, $p = .002$) but significantly less frequent users of the metacognitive strategies of centering one's learning ($t = -2.59$, $p = .01$); the BUU participants utilized the metacognitive strategies of centering one's learning ($t = -2.57$, $p = .011$) significantly less frequently as well; and their HUT peers deployed significantly more often the strategies of analyzing and reasoning ($t = 3.40$, $p = .001$) and the overall cognitive strategies ($t = 2.77$, $p = .006$).

TABLE 8
 Paired Samples T-test Results of Changes in the CSUQ,
 the MSCUQ and Their Subscales for the Three University Samples

	TU (N= 366)			BUU (N= 244)			HUT (N= 323)		
	df	T	p	df	t	p	df	t	p
CSUQ1	365	4.01	.000	244	1.84	.067	322	.875	.382
CSUQ2	365	3.14	.002	244	1.35	.177	322	1.57	.117
CSUQ3	365	2.87	.004	244	1.80	.073	322	3.40	.001
CSUQ4	365	2.13	.034	244	-.288	.774	322	.855	.393
CSUQ	365	4.48	.000	244	1.94	.054	322	2.77	.006
MSUQ1	365	-2.59	.01	244	-2.57	.011	322	-1.71	.088
MSUQ2	365	3.13	.002	244	1.78	.076	322	-.458	.647
MSUQ3	365	-.418	.676	244	.662	.508	322	-.858	.392
MSUQ	365	.945	.345	244	.377	.706	322	-1.23	.218

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Several conclusions concerning the study of changes and differences in cognitive and metacognitive strategy use in English learning can be drawn from the results of this study. First, statistical analyses show that the whole participant sample, as well as male and female students, reported a low use of the cognitive strategies of practicing and creating structure for input and

output and generally a medium use of the other cognitive and metacognitive strategies both at the beginning and toward the end of the term. Meanwhile, the three university samples displayed differing patterns of strategy use: the TU learners reported a similar pattern to that of the whole participant sample; the HUT respondents displayed a low use of the strategies of practicing, creating structure for input and output, arranging and planning, and the overall cognitive strategies but a medium use of the other strategies in both Phases; the BUU students had a low use of the strategies of practicing, creating structure for input and output, arranging and planning, and the overall cognitive strategies in both Phases, a low use of the strategies of sending and receiving messages in Phase 1 and of practicing, evaluating one's learning, and the overall metacognitive strategies in Phase 2, and a medium use of other strategies in both Phases.

As to changes over the term, the whole sample tended to utilize significantly more frequently the strategies of practicing, receiving and sending messages, analyzing and reasoning, arranging and planning one's learning, and the overall cognitive strategies, but less frequently the strategies of centering one's learning toward the end of the term. Meanwhile, males became more frequent users of the cognitive strategies of various categories and the metacognitive strategies of arranging and planning but less frequent users of the metacognitive strategies of centering and evaluating one's learning and the overall metacognitive strategies; and females became more frequent users of all the strategies except those of centering one's learning. And significant differences in nearly half of the scales were observed. When it comes to the three university samples, the TU students became significantly more frequent users of all the cognitive strategies and the metacognitive strategies of arranging and planning but significantly less frequent users of the metacognitive strategies of centering one's learning; the BUU participants utilized the metacognitive strategies of centering one's learning significantly less frequently as well; and their HUT peers deployed significantly more often the strategies of analyzing and reasoning and the overall cognitive strategies.

With regard to differences in the strategy use among various groups of participants, female students reported having a significantly more frequent use of the strategies of creating structure for input and output and centering one's learning in both Phases, yet a significantly less frequent use of the strategies of evaluating one's learning in Phase 1 than their male peers. As to the three university samples, in both Phases, the TU respondents reported using the strategies most frequently while their BUU peers employed them almost the least often. And significant differences

existed among the three samples in all scales in both Phases except CSUQ4 in Phase 2. Namely, the most proficient students tended to use significantly more cognitive and metacognitive strategies than did the least proficient ones.

Considering the composition of the sample selected, the results can be generalized to other EFL contexts in China and shed light on the teaching and learning of foreign languages in similar contexts. Even so, it would be better to investigate the changes in the use of the strategies over a longer period. Future research can also explore the differences and changes in the use of strategies of other categories such as social and compensation strategies and their interaction with other student characteristics. For instance, in a study of 505 Taiwanese university students, Yang (1996) discovered that the students' self-efficacy about learning English was closely related to the use of all kinds of learning strategies. Those who had greater English self-efficacy utilized strategies more frequently, especially strategies for functional and communicative practice. The study also revealed that the participants' beliefs about the value and nature of learning spoken English were significantly correlated with the use of formal oral-practice strategies. In addition, the study showed that the students were able to "to improve the use of their learning strategies through awareness-raising in group interviews and informal strategy instruction (1996: 204). Thus, it is highly significant to enhance FL/SL learners' awareness of strategy use through formal and informal instruction, as Yang (1996) believed that good awareness of metacognitive strategies is characteristic of good readers. Also, it would be interesting to explore factors that may affect learners' change in using certain strategies, as done in Gao's (2006) study which investigated changes in 14 Chinese learners' uses of language learning strategies after they moved from mainland China to Britain.

Moreover, it will be of significance to continue research on gender difference in that understanding gender differences in strategy use helps us (better) beware how gender can affect development and achievement in second/foreign language learning and enable L2 teachers to use this awareness to help their students of either gender to achieve gains in SL/FL learning, as Chavez (2001) claimed.

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