The Effect of Meta-cognitive Learning Strategies on English Learning

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Abstract—It is generally recognized that success in language learning lies partly in the possession of certain skills or learning strategies which will make language leaning more successful, autonomous, pleasurable, efficient and transferable to new situation. Based on an empirical study, this paper aims to illustrate to what degree learning strategies will affect language learning and how strategies are used among high-achieving students and lower scoring ones. The findings of the study reveals the positive effect of learning strategies as well as the importance and necessity of applying strategies training to English teaching.

Index Terms—meta-cognitive learning strategies, autonomous learning, CET-4

I. INTRODUCTION

College English should be a teaching system that is based not only on linguistic knowledge and skills, but also on learning strategies. Learning strategies are "behaviors and thoughts that a learner engages in during learning that are intended to influence the learner's encoding process" (Weinstein and Mayer, 1986, p. 315). Lack of learning strategies results in the fact that English for a long time upset most of Chinese students.

Learning strategies refers to knowledge about when and how to use particular strategies to learn or to solve problem. These learning strategies are important elements in the realization of autonomous learning—the key to learning English well. Oxford (1990) refers to learning strategy as behaviors or actions learners employ to make language leaning more "successful, self-directed, enjoyable, effective and transferable to new situation" (p. 8).

Of all the learning strategies, meta-cognitive strategies play the most significant role in the success of independent learning. O'Malley & Chamot (1990) and Oxford (1990) refers to meta-cognitive strategies as the thoughts and activities that can help learners think about their learning process, make plan for learning, monitor how learning is taking place, and appraise the learning outcome. By practicing and applying meta-cognitive strategies, students will become good learners, capable of handling any problem across an English curriculum.

However, teachers might have the misconception that university students must have already been familiar with these strategies and experienced in using them. The truth is that most students have no ideas about the meta-cognitive process. Yet only through "thinking about thinking" and using meta-cognitive strategies students do truly learn. In view of this, this study aims to examine the frequency of meta-cognitive strategies use in English learning at university level and their relationship with the university students' English performances.

II. THEORETICAL BASES

Meta-cognitive strategy is based on the notion of meta-cognition. According to Flavell (1976), meta-cognition refers to one's knowledge of his or her own cognitive processes and products and anything that is related to them, such as learning-relevant properties of data or other useful information. Briefly, meta-cognition refers to "a person's awareness of his or her own level of knowledge and thought processes" (Chew, cited by Lang, 2012), which is regarded as a higher level of cognition. "In education, it has to do with students' awareness of their actual level of understanding of a topic" (Chew, cited by Lang, 2012).

Flavell (1979, 1987) states that meta-cognition includes both meta-cognitive knowledge and experiences. Meta-cognitive knowledge is the knowledge learner has gained about cognitive processes, knowledge that can be used to regulate cognitive processes. Meta-cognitive knowledge can be divided into three categories, one of which is knowledge of strategy variables, including knowledge about both cognitive and meta-cognitive strategies, and conditional knowledge about when and where it is proper to employ such strategies (Flavell, 1979, 1987). Meta-cognitive experiences refer to the use of meta-cognitive strategies or meta-cognitive regulation (Brown, 1987). Meta-cognitive strategies are successive processes to manage or regulate cognitive activities, thus ensuring that a cognitive goal will be gained. These processes contribute to regulation and managing of learning, and include planning and monitoring cognitive activities, as well as evaluating the outcomes of those activities.

Similar to meta-cognitive knowledge, meta-cognitive regulation or "regulation of cognition" involves three important skills－planning, monitoring and evaluating. (Schraw, 1998; Jacobs & Paris, 1987).

Planning: refers to choosing the proper learning strategies and make sensible use of resources that can have an effect on performing the learning task. Planning includes goal setting, material reading, and questioning and task analysis.

Planning or preparation is one of most important meta-cognitive strategies one can use to improve learning. Taking planning strategy, students are thinking about what their goals are and how they can accomplish those goals efficiently and effectively.

Monitoring: refers to supervision of activities in progress to ensure that everything is under control, thus performance goal can be met. Monitoring is what we take to keep track of how learning process is going. These strategies help learners notice that they may have problems on comprehension and concentration, so that they can find problems out and correct them.

Evaluating: refers to evaluating the outcome of a task, how well the task was accomplished, and the strategies used during the learning process. Evaluating is connected with monitoring. For instance, when the learner realize the fact that he doesn't understand a part of reading material, he would go back reading that paragraph again; when confused about a question, they would skip it and finish the easier ones first. Students' learning behaviors can be corrected through evaluating so that they can have better comprehension.

It is recognized that students tend to perform better on exams and complete work more efficiently if they possess a wide range of meta-cognitive skills. These students tend to be more self-regulated, who can use the "right tool for the job" and they can change learning strategies and skills when necessary to ensure learning efficiency. Those who have a high level of meta-cognitive knowledge and skill can notice obstacles to learning timely and change strategies to ensure goal achievement. After studying the students' ability to solve problems in the fifth and sixth grade, Swanson (1990) concluded that meta-cognitive knowledge can make up for IQ and lack of prior knowledge. Students with a high meta-cognition tended to have used fewer strategies, but could solve problems more effectively than low meta-cognition students, without regard to IQ or previously-required knowledge. Those who have high meta-cognition know clearly about their own advantages and disadvantages, the nature of the task they are performing, and available "tools" or skills, all of which will help to attain the learning goal. These tools or skills are probably more useful in different learning situations if they are general, universal, and independent of circumstances.

Usually, several meta-cognitive processes may work together simultaneously during English learning task and various strategies should be combined to facilitate the improvement of learning outcome. Meta-cognitive strategies instruction can involve training students in thinking skills helpful to regulate their own learning. For Examples, strategies that students can be trained to practice include schedule-making skills, "active reading strategies, listening skills, organizational skills and creating mnemonic devices" (Thompson, L & Thompson, M, 1998, p. 243). Chamot and Rubin (1994) also point out that it is not a particular strategy that leads to improved performance, but rather the executive management of a repertoire of strategies. Undoubtedly, when those strategies take effect harmoniously, they do correlate to improve learners' performance.

It is generally recognized that learners use meta-cognitive strategies to monitor, evaluate, regulate or manage his or her learning. O'Malley and Chamot (1990, p. 227) points out the conviction that students without mastering meta-cognitive strategies do not have direction and ability to evaluate their progress, achievements and to determine their own future direction of learning. Clearly, the meta-cognitive strategies are to enable learners to take on their responsibility for learning advanced management methods or tools. They are closely linked with autonomous learning skills such as planning, monitoring, evaluating, reflecting, decision-making, accessing and organizing information. They have also been proved to best predict the success in learning English. Wenden (1991) maintains that it is necessary to introduce strategy training into plans of developing learner autonomy. She described the autonomous learners as those who have gained the strategies and knowledge to assume some responsibility for her own language learning on a willing and self-confident basis (Wenden, 1991, p. 163).

Therefore, meta-cognitive strategies, the most universal and applicable to all kinds of learning, should be developed first (Oxford, 1990, p. 202). It is of great significance to make learners aware of meta-cognitive strategies that play a fundamental part in learner autonomy. For university students, to become aware of meta-cognitive strategies and integrate them into their daily learning process is more important than ever. Therefore, teachers are responsible to make students familiar with mate-cognitive strategies and cultivate their abilities to manage their own learning and be an autonomous learner.

III. CORRELATION BETWEEN META-COGNITIVE STRATEGIES AND CET-4[1] SCORES

A. Research Questions

The research will focus on the frequency of college students' application of meta-cognitive strategies; the correlation between college students' English levels and their use of meta-cognitive strategies; comparison of the frequency difference between high-achieving students and lower-scoring ones.

B. Participants

Two groups of non-English major sophomore students are chosen as participants in Beijing Information Science and Technology University. The first group consists of 30 students with grades higher than 560 gained in the CET-band 4 examination and the rest 30 students constitute the second group with grades lower than 450.

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[1] CET-4 (College English Test band 4) is one of the most important national English examinations in China.

C.   Research Instruments

The instrument used for collecting data on meta-cognitive strategy use is a questionnaire based on Oxford's *Strategy Inventory for Language Learning (SILL)* (1989), which is designed mainly for testing the level of meta-cognitive strategy use. Some modification has to be made to meet the needs of the study. In order to ensure the reliability of the questionnaire, it was used on a small scale before the study and made necessary changes to the items. Finally, the Cronbach's Alpha for each part reached a high level (0.798), confirming the reliability for the items.

The students' performance in CET- band 4 is used as a measurement of their proficiency in English because it is a comprehensive national examination testing the major English skills including listening, reading and writing.

D.   Procedure

The questionnaires were handed out in the class and all attendants were told before doing the questionnaires that there was no wrong or right for their answers and their choices are totally anonymous, so they should make choice honestly. The data obtained from the questionnaires were analyzed by SPSS 18.0.

E.   Results and Discussions

Table 1 shows the general description of meta-cognitive strategies use among all the students. According to Oxford (1990, p. 300), mean sores that fall between 1.0 and 2.4 are defined as "low strategy use", 2.5 and 3.4 as "medium strategy use", and 3.5 and 5.0 as "high strategy use".

It is revealed in Table 1 that the mean value of 11 items ranges from 2.541 to 3.460, indicating that the students use meta-cognitive strategies in a medium level. Thus, it can be concluded that most participants don't use meta-cognitive strategies on a frequent and satisfying basis.

Among all the 11 questions, item 3 shows the highest mean value of 3.4595, while item 5 and 6 present the same mean value of 2.5405 which are also the lowest. This shows that most college students have the ability to be aware of their mistakes and tend to improve learning based on mistake analysis, but they are weak in making plans in learning languages and less active in practicing English in daily life, perhaps mostly because the mother-tongue environment prevent them from finding opportunities to do that. However, as far as those good independent learners who have strong awareness of meta-cognitive strategies, it is by no means an obstacle to language learning, because learning opportunities can be created on a conscious basis.

TABLE 1
DESCRIPTIVE STATISTICS OF META-COGNITIVE STRATEGIES

		1	2	3	4	5	6	7	8	9	10	11
N	Valid	60	60	60	60	60	60	60	60	60	60	60
	Missing	0	0	0	0	0	0	0	0	0	0	0
Mean		2.649	2.973	3.460	2.838	2.541	2.541	2.811	2.649	2.703	2.676	2.784
Std. Deviation		.978	.763	1.016	.928	1.016	.960	.908	.716	.777	.974	.917

Table 2 shows that the high-achieving group scores higher than lower-scoring group in almost all of the 11 items (9 items with P<0.05, indicating that the scores of the 9 items are significantly different). As a whole, the mean value of total 11 items of group A is 3.0682, while that of group B is only 2.3636.

TABLE 2
A COMPARISON OF MEAN VALUE BETWEEN DIFFERENT PROFICIENCY GROUPS

Questions	High-achieving group	Lower-scoring group	Sig. (2-tailed)
1	2.500	2.500	1.00
2	3.083	2.750	.004
3	4.167	3.000	.000
4	2.833	2.875	.871
5	2.667	2.375	.310
6	2.583	1.750	.001
7	3.417	2.000	.000
8	3.000	2.000	.000
9	3.083	1.875	.000
10	3.167	2.250	.000
11	3.250	2.625	.001
Total	3.068	2.364	.001

Table 3 shows that the difference between mean values of two groups are significant with p=0.011＜0.05, indicating that high-achieving group use meta-cognitive strategies more frequently than lower-scoring group.

TABLE 3
DIFFERENCE OF MEAN VALUE BETWEEN TWO GROUPS

Group	N	Mean value	Std. Deviation	(Independent sample test) Sig. (2-tailed)
High-achieving group	30	3.068	0.831	0.011
Lower-scoring group	30	2.364	0.794	

It is shown in Table 4 that correlations between CET-4 scores and use of meta-cognitive strategies is significant greatly and positively, which reveals that the more frequently the students use meta-cognitive strategies, the better they will perform in the examination and vise versa. This further confirms the claim that frequent use of learning strategies will improve learning ability and in the long run English proficiency will be increased as well.

TABLE 4
CORRELATIONS BETWEEN CET-4 SCORES AND USE OF META-COGNITIVE STRATEGIES

		Score of CET-4	Score of questionnaire
Score of CET-4	Pearson Correlation	1	.457[**]
	Sig. (2-tailed)		.004
	N	60	60
Score of questionnaire	Pearson Correlation	.457[**]	1
	Sig. (2-tailed)	.004	
	N	60	60
**. Correlation is significant at the 0.01 level (2-tailed).			

To sum up, we find in the study that high-archiving students use meta-cognitive learning strategies more frequently than lower-scoring students and the correlation between CET-4 scores and employment of meta-cognitive strategies are significant greatly and positively, thus we can draw the conclusion that employment of learning strategies, consciously or unconsciously, leads to enhancement of learning efficiency and thus improving English performance in the exam.

Since meta-cognitive strategies have a significant effect on language learners' proficiency, it is of importance to train students how to use meta-cognitive strategies to plan, monitor and evaluate their language learning. It is proved that effective independent learners always set the appropriate goals, know how to arrange time in order to learn effectively and can evaluate their learning regularly to get prompt feedback.

Furthermore, being engaged in meta-cognition is a striking feature of good language learners. They know in what aspects they are strong or weak; they know how to deal with the learning task in an effective way by using the available tools or skills. They use the proper tool for the task and adjust learning strategies and skills on the basis of their understanding of effectiveness. Individuals with a good mastery of meta-cognitive knowledge and skills can be aware of difficulties in learning as early and quickly as possible and change strategies timely to ensure goal achievement.

Therefore, it is crucial to make students have the concept of meta-cognitive strategies and improve their skills of using meta-cognitive strategies instead of just teaching them grammar and words.

On one hand, instructions on meta-cognitive learning strategies can be carried out both in class and after class. Nunan (1999, p. 62) points out that strategy training should be included in the regular language teaching plans rather than regarding it as independent learning process. In class, teacher illustrates the meanings and functions of learning strategies, especially meta-cognitive strategies, and then students can have discussions by themselves to get solid understanding about learning strategies. After class, teachers must encourage students to apply learning strategies into practice by means of assigning specific learning tasks to do. In the long run, students will benefit from learning these useful strategies as long as they keep using them in language learning.

On the other hand, the best way to minimize the impact of poor meta-cognition is to apply formative assessment to teaching. Formative assessment refers to "frequent, interactive assessments of student progress and understanding to identify learning needs and adjust teaching appropriately" (OECD, 2005, p. 21). It is a series of assessment processes adopted by teachers during the learning process to adjust teaching and learning activities in order to improve student achievement (Crooks, 2001). It mainly focuses on "qualitative feedback" instead of test scores for both student and teacher to evaluate teaching content and performance (Huhta, 2010). It usually contrasts with summative assessment aiming to monitor educational outcomes, often for purposes of external accountability (Shepard, 2005).

A 10-minute formative-assessment activity after a 40-minute lecture may be helpful for students to learn much more effectively. However, students tend not to ask questions precisely due to their poor meta-cognitive skills which have made them believe that they have understood the lecture perfectly, so it is necessary for us to get familiar with another concept called "minute paper" (Angelo and Cross, 1993) . At the end of each class, students can be asked to answer the two questions as follows: "what was the most important concept you learned in class today?" and "what concept did you find the most difficult or confusing?" These two questions can force students to evaluate their study after a lecture and cultivate their ability of self-awareness so that they can improve their meta-cognitive skills gradually. In this way, only when the teacher act as a guide, as a counselor instead of a commander or an initiator, can learner autonomy be achieved and students have a better grasp of English learning.

IV. CONCLUSIONS

This study examined the frequency of meta-cognitive strategy use in English learning process of non-English major college students in China. The questionnaire which is based on Oxford's *Strategy Inventory for Language Learning (SILL)* (1989) was used in the research. Data were collected and analyzed by SPSS, then the relevant information about the frequency of college students' application of meta-cognitive strategies and correlation between strategy use and CET-4 performance was given respectively in the study.

The study reveals that frequency of meta-cognitive strategies use correlate with English proficiency of students. The more frequently the learners use strategies, the more greatly their autonomous learning ability will be improved, thus the more achievements they can gain in the examination. In general, high proficiency students tend to use more meta-cognitive strategies in English learning process, though generally the frequency is not a satisfying one and there is still room for improvement. All the findings of this study strongly confirm what we have known from previous theoretical and empirical studies, which claim that meta-cognitive strategy can enhance learner autonomy and language proficiency (Wenden, 1991; Oxford, 1990; Guo and Yan, 2007 and Knowles, 1986; etc).

In view of this, it is of necessity to awaken students to the learning process and different styles and strategies for learning. What is more, learning strategies instruction should be included in the regular classroom teaching. Teachers can design some form of assignments to be done in self-access mode without disrupting the syllabus with the aim to encourage students to apply meta-cognitive strategies into practice.

Although many language teachers have already realized the importance of learning strategies, it is not a common practice for them to carry out systematically some effective learning instruction to help students learn more effectively. As a matter of fact, lack of learning techniques and necessary incentive mechanism is the major obstacle to improvement of learning efficiency both in and out of classroom. Therefore, it is highly recommended that teachers and learners should make full use of available resources to practice learning strategies, make the most of students' potential to learn and exercise their brains to the fullest extent, thus achieving the goal of shifting the responsibility of learning from teachers to learners.

APPENDIX.   QUESTIONNAIRE FOR META-COGNITIVE LEARNING STRATEGIES

Please read every statement carefully and choose the responses (1, 2, 3, 4 or 5) that tell how true of you the statement is. There is no right or wrong answers. Just answer as accurately as possible.

1—never or almost never true of me
2—usually not true of me
3—somewhat true of me
4—usually true of me
5—always or almost always true of me

QUESTIONNAIRE FOR META-COGNITIVE LEARNING STRATEGIES

Number	Questions	Choices
Q1	I try to find as many ways as I can to use my English.	1 2 3 4 5
Q2	I notice my English mistakes and I use that information to help me do better.	1 2 3 4 5
Q3	I pay attention when someone is speaking English.	1 2 3 4 5
Q4	I try to find out how to be a better learner of English.	1 2 3 4 5
Q5	I plan my schedule so I will have enough time to study English.	1 2 3 4 5
Q6	I look for people I can talk to in English.	1 2 3 4 5
Q7	I look for opportunities to read as much as possible in English.	1 2 3 4 5
Q8	I have clear goals for improving my English skills.	1 2 3 4 5
Q9	I think about my progress in learning English.	1 2 3 4 5
Q10	I give myself a reward when I do well in English.	1 2 3 4 5
Q11	I talk to someone else about how I feel when I am learning English.	1 2 3 4 5

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