

Effect of Meta-cognitive Strategy Training on Chinese EFL Learners' Reading Competence

Xinyan Wang¹

¹ Foreign Language Teaching Department, Inner Mongolia University for the Nationalities, Tongliao, China

Correspondence: Xinyan Wang, Foreign Language Teaching Department, Inner Mongolia University for the Nationalities, Tongliao, Inner Mongolia, China. Tel: 86-187-475-094-30. E-mail: 13015136527@126.com

Received: November 23, 2014 Accepted: December 18, 2014 Online Published: January 27, 2015

doi:10.5539/ijel.v5n1p159 URL: <http://dx.doi.org/10.5539/ijel.v5n1p159>

Abstract

For EFL learners, reading is one of the most important ways of language input. How to improve learners' reading competence has always been the concern of language teachers and researchers. The concept of meta-cognition is known as cognition about cognition. It is described as the knowledge and control of individual's thinking process and learning activities. The purpose of applying meta-cognitive strategies to English reading lies in improving learners' reading efficiency. This paper reports a research on Chinese EFL college students concerning the application of meta-cognitive strategies in their English reading. Statistics show the positive effect of meta-cognitive strategies on their English reading competence.

Keywords: English reading, meta-cognition, meta-cognitive strategy, meta-cognitive strategy training

1. Introduction

Among the four language skills (listening, speaking, reading and writing), the ability to read is considered one of the most important skills that college students need to acquire. Reading is the most important skill for students to achieve academic goals. How to improve students' English reading proficiency has long been a common concern of researchers and English teachers. According to College English Curriculum Requirements revised in 2007 in China, the basic requirement for reading includes that "students are expected to be able to employ effective reading strategies while reading." It is more important to teach them how to fish than to give them fish. But before we teach how to fish we should have some knowledge of the fishing areas students are in so that we can recommend some appropriate rods and baits to them, and meta-cognition, ever since its emergence in the 70's of last century, has always been one of the focuses of educational research. The concept of meta-cognition is put forward by John Flavell of Stanford University. Flavell (1976) used the term metamemory in regard to an individual's ability to manage and monitor the input, storage, search and retrieval of the contents of his own memory. Flavell invited the academic community to come forth with additional metamemory research, and this theme of meta-cognitive research has continued for more than thirty years. He implies with his statements that meta-cognition is intentional, conscious, foresighted, purposeful, and directed at accomplishing a goal or outcome. These implications have all been carefully scrutinized in subsequent research, and in some cases have been the subjects of controversy among researchers in meta-cognition. In his 1976 article, Flavell recognized that meta-cognition consisted of both monitoring and regulation aspects. It was here that the term meta-cognition was first formally used in the title of his paper.

Modern cognitive psychology has suggested that reading is a kind of active and complex psychological activity and a thinking process, in which the reader, based on his own knowledge, predicts, evaluates and affirms information. An effective reading process is not only a process of cognition, but also a process of regulation. Consequently, more emphasis in the field of reading comprehension has been put on the role of meta-cognitive awareness. English teaching in China has long been under the influence of behavioral theory, teacher's teaching concepts is to be renewed. The instruction of learning strategy has not been practically spread broadly. Reading activity not merely aims to understand words, sentences, or texts, an integration of the reader's previous knowledge, language competence and meta-cognitive strategies. Thus, learning about the strategies is not sufficient, students should also know how to apply them in reading. Moreover, the number of college students in China is on the rise nowadays. Consequently, teachers have to face a class of 50 to 80 students, or even more, whose English reading proficiency varies a lot. In order to adapt to the new teaching environment and attain the

educational goal, teachers should consider how to foster students' ability to read effectively. Learning strategies should be employed to achieve this goal.

2. Theoretical Background

2.1 *Meta-Cognition and Meta-Cognitive Strategy*

We may find different definitions by different researchers, while this thesis mainly talks about the research by Flavell, O' Malley & Chamot and Wenden. Flavell explained that "meta-cognition is thinking about thinking". It had been broadly and loosely described as any knowledge and regulations on thinking process or learning activities. It was called meta-cognition because its fundamental meaning was cognition about cognition. According to Flavell, meta-cognitive knowledge, meta-cognitive experience and meta-cognitive monitoring are the three components of meta-cognition. Meta-cognitive knowledge is the relatively stable information that humans have about their own cognitive process. It is further divided into three categories, which concerns person knowledge, task knowledge and strategic knowledge (Wenden, 1998). Among them, person knowledge is the knowledge learners have obtained about individual factors that influence learning. Task knowledge relates to the purpose, nature and demands of a task. Strategic knowledge refers to the implication of strategies, the purpose to use them, and how and when to use them. According to Flavell, meta-cognition plays an important role in language teaching and learning. Firstly, meta-cognition can improve the level of the learner's thinking and his language proficiency. Then, meta-cognition has great impact upon the learner's efficiency in implementing a task. Thirdly, by regulating cognitive activities it can facilitate low cognitive abilities. A student with strong cognitive abilities doesn't always do well if he has no meta-cognitive abilities. Meta-cognitive strategy as one of the learning strategies requires making plans for learning beforehand, monitoring the learning activity as it is taking place and reflecting on learning after an activity is finished.

In the light of O' Malley & Chamot's theory, meta-cognitive strategies are divided into three categories: (1) Planning: analyzing the crucial factors for the successful fulfillment of the task. (2) Monitoring: be alert of one's problems in comprehension, learning speed and time consumption, and whether learning goals have been achieved as well as self-inquiry regarding the content of the learning materials. (3) evaluation: reviewing the effectiveness of the employed strategy taking into consideration the learning task to be implemented

Meta-cognitive strategy in the past 30 years has become the focus of second language acquisition research. Much research abroad has shown that: meta-cognition plays an important role in language learning, reading comprehension, writing, memory, attention, problem solving and various learning activities. Meta-cognitive theory categorizes reading strategies into three groups: declarative knowledge is the understanding about what these reading strategies are; procedural knowledge is the knowledge of the application of reading skills; conditional knowledge is about why and when to use appropriate reading strategies.

The impact of meta-cognition on reading is mainly reflected in three ways: self-evaluation, self-plan and self-regulation. Self-evaluation is to analyze the characteristics of reading materials and reading ability of individuals; Self-plan is to select the appropriate reading strategies and make reasonable arrangements on cognitive resources and time; Self-regulation is the adjustment of reading activities to achieve the desired goal.

Another important theoretical issue is the distinction between cognition and meta-cognition. Meta-cognition is generally described as cognition about one's own cognitive process (Flavell, 1979). Although this issue makes sense in the abstract, the distinction between them is rather slippery. To say one particular reading activity belonging to wholly meta-cognitive and another to be not-at-all meta-cognitive is often difficult if not possible. In addition, some instructional practice may be categorized as enhancing meta-cognitive strategies by some instructors while the same set of instructional programs may be described as fostering cognitive strategies by other curriculum designers. Therefore it tends to be less productive to dwell on the distinct differentiations, especially when it is concerned with instructional applications though the distinction does make sense theoretically in the abstract.

2.2 *The Components of Meta-Cognition*

Meta-cognition has two independent and correlated components: meta-cognitive knowledge and control. Meta-cognition is knowledge about cognition. It deals with the factors influencing process and result of cognitive activities. It is about how these factors function and how they are related to each other. Meta-cognitive knowledge has three parts. Firstly, knowledge regarding learners, which can further be divided into three categories. a. knowledge about individual within himself; knowledge about the difference between individuals; knowledge about main factors influencing individual's cognitive levels and activities. b. knowledge about tasks. c. knowledge about learning strategy and its use.

Another categorization has the following main aspects: (1) knowledge concerning the characteristics of the reading materials (such as length, difficulty, familiarity, fun, structure, etc.); (2) knowledge of the reading tasks such as the special requirement on the part of learners, the requirement for extraction and evaluation, etc. (3) The strategic knowledge (such as monitoring and regulating learning strategies, the effective measures of storage and retrieval of information). (4) knowledge on individual's personal characteristics, such as their motive, interest, other personal characteristics factors affecting reading ability. In the course of reading meta-cognitive monitoring are supposed to effectively and appropriately coordinate the interaction of these four aspects.

To be specific, to use meta-cognitive strategies is to make prompt plans, select appropriate and effective strategies, evaluate the effectiveness of each operation, check results, modify the strategy and take effective remedial measures to deal with problems.

Meta-cognitive monitor is the management and control of cognitive activities. In the whole process of cognition, the ongoing cognitive activities are taken as the objects, the individual conduct a conscious monitoring, control and regulation. This process is operated in working memory. Meta-cognitive control has two components. a. the monitoring of cognitive process (aware of when the strategies are and are not being appropriately employed.) b. the competence to regulate cognitive activities to promote effectiveness (applying strategies to reading to remedy comprehension failures, for instance).

Meta-cognitive monitoring generally includes four parts: (1) plan making. Plan refers to the design of performing a task, the prediction of results, the individual's prediction in light of the quality, characteristics of a cognitive task, namely, the management of cognitive action to be done. (2) monitoring execution. Make timely evaluation. In the process of cognitive activity, review cognitive activities and find the deficiencies in cognitive activities, and promptly modify and adjust cognitive strategies. (3) check the results. In accordance with the cognitive plan, at the end of the cognitive activities, check and evaluate the learning result, sum up gains and losses, including the correction of errors, removing obstacles and adjusting thinking. The result checking is both a cognitive activity, and also the beginning of a new round of cognitive activity to regulate learning strategies and to take appropriate remedial measures, (4) take remedial measures based on a cognitive result, take remedial measures to solve the problems and achieve the goal. Regulation exists in the whole process of teaching and learning activities, students may at any time make necessary and appropriate regulation according to the actual situation of the teaching activities. In short, the process of meta-cognition is the guidance, regulation of our cognitive processes.

In accordance with the learning process, students' self-control can be divided into eight components, they are: planning, preparation, awareness, methodology, implementation, feedback, remedial and summary.

Planning and preparation is the proof for students' monitoring ability before carrying out a specific learning task; Awareness, methodology, implementation is the proof for students' monitoring ability in carrying out a specific learning task; Feedback, remedial, summary is the proof for students' monitoring ability after carrying out a specific learning task.

2.3 Meta-Cognition in Reading

Successful reading comprehension does not occur automatically. It calls for reader's conscious effort. Through meta-cognitive strategies, a reader allocates significant attention to controlling, monitoring and evaluating the reading process. Meta-cognitive strategies can facilitate the reader to improve reading process when cognition fails to work. In the research field of language learning, more and more people put emphasis on the role of the learner, and this tendency is in accordance with meta-cognitive theory which involves learner's voluntary participation. Consequently the instruction of the application of meta-cognitive strategies in EFL reading is of significant importance. The aim of this instruction should be to help the reader not simply know which strategies to use, but also under what circumstance to apply them successfully. Oxford suggests that in order to reinforce the use of such strategies, the identification of complementary strategies modeled by an instructor is quite necessary for an effective reading instruction program. Readers who show evidence of meta-cognition deficiencies can become skilled readers and learners if they are provided with instruction in effective strategies and trained to check and monitor their understanding of the reading material. With respect to this, Oxford has shown that some differences do exist between skilled and less skilled readers in terms of their actual and reported reading strategies; their use of global reading strategies, their meta-cognitive awareness, their perception of a good reader, and their self-confidence as readers and points out training in meta-cognitive strategies help learners develop their reading skills and raise their language proficiency levels.

The integration of meta-cognitive reading strategies into cognitive strategies training model proves to be more helpful than traditional teaching. American psychologists believe that this model to be effective in getting

students informed of under what circumstances to use these strategies as well as of the strategy knowledge. That is, besides the teaching of declarative knowledge and procedural knowledge, the instruction of conditional knowledge is more emphasized.

In reading process, the impact of meta-cognition on reading comprehension is reflected on three aspects: self-evaluation, self-planning and self-regulation. Evaluation is to make analysis on the characteristics of reading materials and individual's reading competence. Plan is to select the appropriate reading comprehension strategies to achieve the purpose of reading comprehension, and to arrange cognitive resources and time appropriately. Regulation is the monitor and adjustment of reading activities to achieve the desired goal.

The purpose of reading is to understand the meaning of reading materials and learner's reading competence is the reflection of reader's ability of recapitulation, induction and reasoning. The level of reading strategies reflects the ability of selecting, transmitting and strategy application; monitoring ability reflects the evaluation of readers on the reading process and efficiency.

To monitor the reading process and strategy application can better achieve the purpose of understanding reading materials. To execute the monitoring strategy in reading is to be clear about the reading goals, adjust reading strategies based on reading tasks and requirements, to identify and pay due attention to the important content of reading material and to be capable of dealing with failures in understanding. For example, be aware of the difficulty in reading, find out the reasons and adopt effective strategies to deal with the obstacles.

3. Methodology

In order to verify the effectiveness of meta-cognitive strategies in improving reading performance, an experiment is conducted on 216 sophomores of non - English majors within ten weeks.

3.1 Research Questions

The present study is an empirical one. It is to verify the effectiveness of meta-cognitive strategies in improving reading performance for minority students in Inner Mongolia Nationalities University. All of the students are of Mongolian nationality. Most of them were born and brought up in Mongolian language environment and Mongolian is their mother tongue. Consequently, in learning English as a foreign language, their thinking process and cognitive style as a group may differ to a certain extent from the majority students in China who are of Han nationality. This empirical research aims to find answers to the following questions:

How are the meta-cognitive reading strategies applied before and after the training?

As far as the subjects in this experiment are concerned, will meta-cognitive reading strategy training influence their reading performance?

Is the training model employed in this experiment an effective one?

3.2 Hypothesis

In the light of the previous theories and researches, we hypothesize that reading achievements positively correlate with meta-cognitive levels. The effective application of meta-cognitive strategies is one of the influential factors of a student's reading performance. Good students and poor students differ considerably regarding meta-cognitive awareness. No matter what proficiency EFL students have achieved in reading, they need meta-cognitive instruction.

3.3 Subjects

The subjects in this research were 216 sophomores of non-English majors at Inner Mongolia Nationalities University. All of them are of Mongolian nationality. Most of them were born and brought up in Mongolian language environment and Mongolian is their mother tongue. Consequently, in learning English as a foreign language, their thinking process and cognitive style as a group may differ to a certain extent from the majority students in China who are of Han nationality. Their age ranged from 19 to 22. The average age of the subjects was 20.18. They were assigned into two classes and considered at pre-intermediate level of language proficiency. One hundred and eighteen of the subjects were female, and ninety-eight were male. One class was randomly chosen as the control group and another one as the experimental group. In the control group the subjects numbered to 110 and there were 106 students in the experimental group.

3.4 Instruments

To start with the experiment, homogeneity between the groups concerning strategy knowledge and English proficiency is to be proved. Thus a learning strategy questionnaire and pre-test were developed and used.

Pre-test and post-test

A reading comprehension pre-test was provided to all subjects one day prior to the onset of training. The pre-test paper was a reading comprehension test which was chosen from College English Test Band Four. The test included 20 multiple-choice items and consisted of 4 passages, which were a little beyond their current reading levels. Following each passage, there were 5 multiple-choice questions: 1-2 main idea questions, 2-3 factual information or detail questions, and 1-2 inference questions. It must be finished within the limited time (35 minutes). Another similar reading comprehension post-test was conducted at the end of the training.

Questionnaire

A learning strategy questionnaire was designed to decide how similar the experimental and control groups were in their previous language study, their knowledge of learning strategies, particularly meta-cognitive reading strategies. None of the experimental or control groups received strategy-based instruction previously. In addition, this questionnaire is written and carried out in Chinese for the purpose of saving time and avoiding ambiguity in understanding on the part of the students. The questionnaire includes 30 meta-cognitive reading strategy statements. All the items are designed as multiple-choice type including five choices. Each choice represents one degree. 1 = never or almost never used, 2 = not generally used, 3 = sometimes used, 4 = usually used, 5 = always or almost always used. The teacher uses descriptive statistics (standard deviation, means, etc) to obtain the information on the use of the meta-cognitive strategies.

3.5 Design of Meta-Cognitive Strategy Training

The syllabus of College English course took a guiding function in carrying out the research. The textbook used for this course was New Horizon College English published by Foreign Language Teaching and Research Press, China. Both groups received the usual training based on the procedures suggested in the Teacher's Book. The students of the control group only received the normal classroom teaching without intentionally arranging strategy-based instruction and monitoring their learning, whereas the students of the experimental group received the strategy-based instruction, that is, the students of the experimental group not only followed the syllabus, but received the training in a strategy-based format. Rather than being lectured in a separate lesson, the strategies were integrated into the regular classroom learning activities. At times, the focus on the strategies was explicit in that the instructor demonstrated the application of reading strategies, and at other times the strategies were implicitly embedded into the classroom activities. That is, the students received the instruction with strategy training as well as language knowledge and cognitive knowledge. In this approach, the teacher systematically introduced and reinforced the learning strategies in reading. In carrying out the strategy-based instruction, the teacher has at least three options: He can go over the reading materials first and then determine which strategies to be put into use and where; he may suggest to the students a set of strategies and design activities around them; he can integrate strategies training implicitly into the lessons whenever it seems appropriate.

3.5.1 Think-Aloud Method

In order to demonstrate the process in selecting and applying a meta-cognitive technique or strategy, the teacher verbalizes aloud while reading orally, this is called think-aloud method. The goals of using think-aloud method in the study are: to cultivate students' ability to monitor their reading and take correct actions when needed; to give students the opportunity to see the kinds of strategies a skilled reader utilizes to construct meaning and cope with comprehension problems; to provide the students an opportunity of experiencing effective reading and problem solving and to transfer these strategies to their independent reading. In the process of modeling, students and the teacher read a text together. The teacher paused periodically reflecting on how the material was being processed and understood, and meanwhile, what kind of strategies were being used by the teacher to solve comprehension problems. Then through practice, students internalized the meta-cognitive strategies in reading. Gradually, verbal intervention became less and less and students were required to think by themselves, thus achieving an automatic state of strategy use. This method will help students have direct experience of using strategies to process the text. They are expected to know not only what strategies are, but also when and where to use them to solve comprehension problems. And the teacher's role is not to give explanations for the text but to act as a counselor, a guide and to encourage students to proceed and complete the think-aloud procedure.

The reading strategies that readers engaged in while thinking aloud are heavily guided by meta-cognition. The act of thinking aloud by its very nature requires the reader to be aware of the comprehension process. The process of thinking-aloud brings to the surface and externalizes the comprehension process for the reader. As such, it is a process that both requires and induces meta-cognition. Meta-cognition as it relates to reading involves the reader being aware of the reading process and knowing what to do when the reader's level of comprehension is not sufficient, or does not satisfy the reader's goals and desires. We assume that more skilled readers are more likely to engage in explanatory processes while reading because they are more aware of

whether they do or do not understand the text and they know whether explanation will help them to attain their comprehension goals. Regardless of reading skills, when readers are prompted to think aloud, they are generally more aware of the reading process. This awareness emerges as a consequence of the very nature of thinking aloud. However, readers may or may not be aware of the various types of reading strategy that will help them to better understand the text and more effectively explain it. Thus, thinking-aloud both requires and induces meta-cognitive process at some level.

The product of thinking-aloud allows the researchers to study reader's ability and propensity to use comprehension strategies. It allows us to examine the ebb and flow of comprehension processes, which dynamically change as a function of the text as well as the reader's goals and interests. Thinking-aloud provides a moving snapshot of reading and meta-cognitive processes, and thus allow researcher to better understand comprehension processes. Understanding the relationship between meta-cognition and thinking-aloud is critical to achieving the ultimate goal of better understanding the comprehension progresses revealed in these tasks.

3.5.2 Training Process

The training includes five steps:

Preparation

Firstly the teacher made it clear that the significance of meta-cognitive reading strategies should be always kept in mind on the part of learners and then a handout on meta-cognitive strategies knowledge is distributed to the students. Five main components for meta-cognition include: (1) preparing and planning for learning (2) selecting and using learning strategies (3) monitoring strategy use (4) orchestrating various strategies and (5) evaluating strategy use.

Modeling

In this period how to use meta-cognitive strategy in reading was to be presented. The teacher should point out the characteristics and usefulness of the strategy and take his or her own reading process as an example and through the reading task illustrate his own strategy use. Learners were provided with a variety of strategies to use under different situations.

Practice

In this phase, students were given the chance to practice the application of meta-cognitive strategies by finishing an authentic learning task. They were expected to be quite conscious in applying the meta-cognitive strategies in implementing their reading task. The learners practiced planning their learning, monitoring their own progress while using multiple strategies and reviewed their accomplishment in the process of reading. The students were required to be flexible in employing multiple strategies available to them. For example, when a student finds it hard to carry out the reading task efficiently due to lack of background knowledge, he may switch to focusing on more background information rather than labor on his reading material. Another instance may be that when a student find it quite useful to go over the questions to be answered to obtain the general idea of the reading material before real reading, he may just extent this skill to other reading tasks.

Evaluation

In this stage opportunities were offered to evaluate on students' success in using strategies so as to develop their meta-cognitive awareness in reading. After practice using strategies, the students may question themselves or discuss in groups concerning the effect of their meta-cognitive strategy employment. They are encouraged to talk about their own recorded reading process, exchange ideas on some particular strategies and comment on the problems that they may have come across in using them. They may also discuss how to turn to other skills under the situation that the strategies they are using do not work.

Expansion

In this last stage the teacher should stimulate the learners to put into use to new contexts the strategies that they recognized to be most effective, and hopefully form the habit of using these strategies when necessary. What's more, students are supposed to be able to employ these strategies not only in reading comprehension but also other fields of language learning.

At the end of the course both the control group and the experimental group were given the reading comprehension test and the results of the tests were compared to find the effects of the training.

3.6 Data Collection

To make statistical comparison between experimental group and control group, necessary data are to be collected

beforehand.

3.6.1 Pilot-Test of Reading Strategy Questionnaire

One week before the questionnaire was sent to subjects, it was pilot-studied on 10 students from the same college, who were in the same grade with the subjects, to find out whether some strategies inappropriate for intensive reading exist; whether there is vague expression which may cause misunderstandings among subjects. Based on the result from the pilot-study, the researcher revised the original 39-item questionnaire into 30-item questionnaire to make it more appropriate for examining the perceived use of strategies in reading.

3.6.2 Administration of Background Questionnaire

The background questionnaire was carried out as a classroom activity to students in their normal reading class by the researcher, who is also reading instructor of the students as well. After the students were told that the purpose of the background questionnaire was for the researcher to use some background information obtained about the subject in the teaching to examine the differences in their meta-cognitive awareness and perceive use of strategies for intensive reading as EFL readers, all students took it seriously. Since the questionnaire was written in Chinese, the students had no difficulty understanding the questions, it took the students about 20 minutes to complete the questionnaire.

3.6.3 Administration of Reading Tests

The pre-reading test was administered one week after the background questionnaire. The subjects were asked to finish reading the four passages with 20 multiple-choice items within 35 minutes in accordance with the requirement of CET4. They were also told that the scores they got in the test would serve as indicators of their reading proficiency, their strengths and weaknesses, which would guide the teacher to help them improve their reading abilities and their scores would not be part of their final score. In this way the researcher saw to it that the subjects felt relaxed about the test but treated it seriously, which guaranteed the authenticity of the score. Subjects were also told not to hand in their test paper if they found they had done the reading test before. Although 221 students took the reading test, only 216 were valid since 4 admitted they had done the reading test and 1 failed to hand in her questionnaire, altogether 5 samples were considered invalid. After the training, the post-test was conducted to the experimental group and the control group.

3.6.4 Administration of Reading Strategy Questionnaire

One week following the post-test, the reading strategy questionnaire was administered to the students. They were told that the strategy questionnaire was to examine their perceived use of strategies in reading. The students were also given full explanations on the directions of the questionnaire, instructed to read the 30 statements carefully and circle the number which best described their perceived use of the strategies in the statements using a scale ranging from 1 (I never or almost never use this strategy) to 5 (I always or almost always use this strategy) . In addition, the students were advised to raise their hands to ask the teacher if they had any difficulty in understanding the questions in the questionnaire.

4. Data Analysis and Discussion

The author developed the questionnaire mainly based on O'Malley and Chamot's classification system (O'Malley & Chamot, 2001). It is a self-scoring survey and the meta-cognitive strategies are grouped into five categories: planning, self-management, selective attention, self-monitoring and self-evaluating strategies. These categories involve the variables which elicit information concerning specific use of meta-cognitive strategies in reading. Students respond on a 5-point Likert scale: 1 (never or almost never use), 2 (sometimes use), 3 (often use), 4 (usually use), 5 (always or almost always use). On the basis of the collected data, statistical analysis has been made by means of SPSS.17.0.

4.1 The Experimental Group's Application of Meta-Cognitive Strategy Before and After the Training

Table 1 shows the experimental group's application of meta-cognitive strategy before the training. It shows that before the training, the means of all the strategies are rather low (all lower than 2), which shows the students in the experimental group are rather poor at using meta-cognitive strategies.

Table 1. The experimental group's application of meta-cognitive strategy before the training

Strategy Category	Means	Std.Deviation
planning strategy	1.76	0.51
self-management strategy	1.49	0.49
Selective attention strategy	1.89	0.47
monitoring strategy	1.75	0.25
evaluating strategy	1.57	0.56

At the end of the experiment, we conducted the same questionnaire survey to the experimental group to see any change in their strategy application and to find the answer to the first question. Table 2 shows the application after the training

Table 2. The experimental group's application of meta-cognitive strategy after the training

Strategy Category	Means	Std.Deviation
planning strategy	3.39	0.54
self-management strategy	3.43	0.47
selective attention strategy	3.97	0.48
monitoring strategy	2.12	0.61
evaluating strategy	2.92	0.43

Figures in Table 2 show an increased level of strategy awareness and application. Meanwhile, there is a considerable gap among the means of strategy categories, ranging from a high of 3.95 to a low of 2.12, indicating students' preference in choosing among these strategies. To be specific, the individual meta-cognitive strategy usually used by the students is: paying attention to notes in the text (mean=3.94). The individual strategies that are especially seldom used (mean below 2.0) by the students are: (a) deciding which parts of the reading material to read intensively and which parts to scan. (b) From time to time, I pause to think about whether my reading speed and progress are satisfactory and whether I am using an appropriate strategy. (c) After finishing a certain reading task, test the results of my learning. (d) Thinking directly in English when reading. (e) Focusing on understanding the sentence structures. (f) Paying attention to textual structures; (g) reading critically; (h) Summarizing the text in English of the five meta-cognitive strategy categories, the selective attention strategy category is most favored by the students, and the monitoring strategy category is least used by them. These findings clarify the learners' state of strategy employment, which may provide reference for further research.

4.2 The Comparison of Results in Questionnaire and Pre-Test

To make sure of the homogeneity of the two groups in terms of language learning strategies knowledge, the pre-treatment learning strategy questionnaire was carried out. No remarkable difference between the experimental group and control group was found (see Table 3). In simple words, the two groups were homogenous in terms of meta-cognitive strategy knowledge. Besides, both groups had never received strategy-based instruction.

Table 3. Results of meta-cognitive strategies questionnaire before the instruction

Means		Std. Deviation		P
Ex. group	Con. group	Ex. group	Con. group	
1. 68	1. 62	0.54	0.75	0.077

To make sure of the homogeneity of the two groups concerning reading proficiency, an independent sample test was conducted to identify the difference between the performances of the two groups on reading comprehension test before the experiment. No remarkable difference was shown between the mean scores of the students in the control group and the experimental group. In other words, before the training, the two groups were homogenous in reading comprehension competence. The result is presented in Table 4.

Table 4. Comparison between experimental group and control group in reading pre-test

Means		Std. Deviation		difference
Ex. group	Con. group	Ex. group	Con. group	
79.08	78.75	8.7	9.2	0.36

4.3 The Effect of Meta-Cognitive Strategies Instruction on Reading Proficiency

In order to find the effect of meta-cognitive strategies training on reading proficiency, both groups took part in a post-test of reading comprehension. The results of the post-test in two groups were compared using the independent sample T-test statistical procedure, whose result indicated that, as far as the mean scores were concerned, a significant difference existed between the two groups. That is to say, although no remarkable difference is shown between the control group and the experimental group in terms of reading comprehension before the training the experimental group outperformed the control group on reading comprehension after the training. The results of the post-test of both groups are summarized in Table 5.

Table 5. Comparison between experimental group and control group in reading post-test

Means		Std. Deviation		difference
Ex. group	Con. group	Ex. group	Con. group	
89.35	79.21	10.2	12.4	10.14

While gathering the post-test scores, the teacher carried out the questionnaire survey concerning the usage of meta-cognitive strategies in reading again. The result is presented in Table 6.

Table 6. Results of meta-cognitive strategies questionnaire after the instruction

Means		Std. Deviation		P
Ex. group	Con. group	Ex. group	Con. group	
3.17	1.73	0.79	0.63	0.003

Table 6 shows, after ten weeks' instruction, the experimental group use meta-cognitive strategies more often. The P value is lower than 0.05. It shows there was a significant difference between the two groups in employing meta-cognitive strategies in reading. Consequently, the experimental group outperformed the control group in reading comprehension achievements.

4.4 Findings

Based on the experiment which has been carried out within 10 weeks, the following conclusions are drawn.

The statistical analysis shows that before the training, the application level of meta-cognitive reading strategies of the students in this experiment was rather low (mean below 2.0). Some students just had little idea or even never heard of such a strategy. Some students are not convinced of its positive effect on their reading effort though they admit it is kind of a skill in reading. Still others don't know under what circumstance to use these strategies in the process of reading. However, after the training, a significant difference appeared in strategy application (P value lower than 0.05), which indicates that learner's strategy application ability can be enhanced through training. Besides, the questionnaire shows that after the training, the individual meta-cognitive strategy usually used (mean above 3.5) by the students is: paying attention to notes in the text (mean=3.94), which belongs to the selective attention strategy. The individual strategies that are especially seldom used (mean below 2.0) by the students are:

- a. Deciding which parts of the reading material to read intensively and which parts to scan.
- b. From time to time, I pause to think about whether my reading speed and progress are satisfactory and whether I am using an appropriate strategy.
- c. After finishing a certain reading task, test the results of my learning.
- d. Thinking directly in English when reading
- e. Focusing on understanding the sentence structures.
- f. Paying attention to textual structures;

g. Reading critically;

h. Summarizing the text in English.

Of the five meta-cognitive strategy categories, the selective attention strategy category is most favored by the students, and the monitoring strategy category is least used by them. These findings clarify the learners' state of strategy employment, which may provide reference for further research.

As is shown in the results of the experiment, the experimental group outperforms the controlling group in English reading tests. Consequently, meta-cognitive strategies practically have a positive impact on students' reading performance. It can be regarded as an effective approach to bring about improvement in reading.

The teaching model in this experiment is a five-step process: preparation, modeling, practice, evaluation and expansion. The outcome of the experiment proves it to be an effective model to help the learners get access to this reading strategy. After the training, the students have stronger awareness of applying meta-cognitive strategies and become more skillful in employing them in reading. This indicates that the meta-cognitive strategy training modal in this experiment is a feasible one for meta-cognitive strategy training.

4.5 Limitation

Although the researcher has obtained some meaningful results from the study, some limitations are not to be ignored. Owing to objective factors, this study was conducted within a limited time of ten weeks. In order to draw stronger conclusions, the whole experiment should be carried out in a comparatively longer period of time. Besides, the questionnaire adopted in this paper is a mixed one, drawing on several researchers' design. To a certain extent, its classification of various strategies may lack authority. Moreover, the strategy items in the questionnaire may provide only a partial list of all the strategies practically used by the learners, so when dealing with the questionnaire, students may have chosen the one they considered best or the one they were most familiar with. A greater variety of strategies need to be investigated in future studies.

5. Conclusion and Suggestions

After ten weeks' training, there was a significant difference between the experimental group and the control group in applying meta-cognitive strategies in reading. The experimental group outperformed the control group in reading achievements. Of the five meta-cognitive strategy categories, the selective attention strategy category is most favored by the students, and the monitoring strategy category is least used by them. These findings clarify the learners' state of strategy employment, which may provide reference for further research.

The teaching model in this experiment is a five-step process: preparation, modeling, practice, evaluation and expansion. The outcome of the experiment proves it to be an effective model to help the learners get access to this reading strategy. After the training, the students have stronger awareness of applying meta-cognitive strategies and become more skillful in employing them in reading. This indicates that the meta-cognitive strategy training modal in this experiment is a feasible one in meta-cognitive strategy training.

The following pedagogical implications result from this research:

Students' awareness of strategy use needs to be enhanced. Some students are just not used to applying strategies to their learning, and their motive is not strong enough. As a result, they use little chance to strengthen the application of learning strategies. So teachers should encourage and guide students to try a variety of learning strategies, including those that they may not be familiar with. Especially in using meta-cognitive strategies, teachers should provide adequate opportunities for students to monitor, evaluate and regulate their learning activities.

The ultimate goal of providing strategy training is to cultivate students' autonomous learning ability. A teacher is no longer a mere answer provider, but functions as a coach, a model, a stimulator and an assistant. They should be good at observing learners' use of strategies and provide with them necessary guidance and advice.

Teachers should understand the individual differences among the learners and help them identify and diagnose their learning styles, so as to find out those strategies that best match their learning styles and cognitive process.

This kind of training curriculum design requires instructors to be very skillful and strategic in their teaching practice. They must be qualified in responding to students' needs for feedback and guidance in reading. To achieve this goal, teachers must themselves have a firm grasp not only of the strategies they are teaching but also of instructional strategies that they can flexibly employ to facilitate their teaching. That is to say, it is even more important for teachers to be meta-cognitive than it is for their students. Teachers must be reflective about what it is that they are doing when they teach, so that they can better evaluate how their instruction is affecting their students.

References

- Baker, L. (1984). *Meta-cognitive skills and reading handbook of reading research*. New York: Longman.
- Block, E. L. (1992). See how they read: Comprehension monitoring of L1 and L2 readers. *TESOL Quarterly*, 26(2). <http://dx.doi.org/10.2307/3587008>
- Breen, M. P. (2000). *Classroom decision making*. Cambridge: Cambridge University Press.
- Brown, H. D. (1994). *Principles of language learning and teaching*. New Jersey: Prentice Hall Regents.
- Carrell, P. L. (1989). Meta-cognitive awareness and second language reading. *Modern Language Journal*, (2). <http://dx.doi.org/10.1111/j.1540-4781.1989.tb02534.x>
- Cohen, A. D. (2002). *Strategies in learning and using a second language*. Beijing: Beijing Foreign Language Teaching and Research Press.
- Ellis, R. (1994). *The study of second language acquisition*. Oxford: Oxford University Press.
- Flavell, J. H. (1976). *Meta-cognitive aspects of problem solving—The nature of intelligence*. New Jersey: Erlbaum.
- Flavell, J. H. (1979). *Meta-cognition and cognitive monitoring*. New Jersey: Erlbaum.
- Flavell, J. H. (1985). *Cognitive development*. NJ: Prentice-Hall.
- Malley, J. M., & Chamot, A. U. (2001). *Learning strategies in second language acquisition*. Shanghai: Shanghai Foreign Language Education Press.
- Neil, J. A. (2001). *Exploring second language reading: Issues and strategies*. Beijing: Foreign Language Teaching.
- Oxford, R. L. (1990). *Language learning strategies: What every teacher should know*. New York: Newbury House Publishers.
- Wenden, A. (1991). *Learner strategies for learner autonomy*. London: Prentice Hall.
- Widdowson, H. G. (1983). *Learning purpose and language use*. Oxford: Oxford University Press.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).