

Effects of the Metacognitive Strategy Program on the Attention Process for Elementary Students*

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Abstract

The attention process is a vital stage of the learning process, and metacognitive monitoring and control are essential requirements for the use of other learning strategies. This study showed the effectiveness and the acceptability of the Metacognitive Strategy Program on Attention Process which is designed for elementary students. The Metacognitive Strategy Program on Attention Process consists of three sessions, and is focused on the monitoring of and control over the attention process. It took three weeks to run all three sessions (one session a week). 77 students were assigned to an experimental group, and 33 students to a non-experimental group. Assessment of Learning Strategies for Adolescents (ALSA) was used for pre- and post-tests. Analysis of Covariance (ANCOVA) was used to even up the pre-test scores, and the two groups were compared in terms of their post-test scores. The post-test score of the experimental group was higher than that of the non-experimental group, and the difference was significant ($F=4.54, p<.05$). This result suggests that the Metacognitive Strategy Program on Attention Process has a positive effect on students' use of cognitive and metacognitive strategies.

■ Key words: metacognition, learning strategy, attention, self-monitoring, metacognitive control, Assessment of Learning Strategies for Adolescents (ALSA)

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I. Introduction

Several studies were conducted to present models and proper interventions of academic underachievement. Among the models, the impact of the Cognitive / Learning Strategy Model was remarkable, since this model focused on the changeable factors in the context of educational intervention, and emphasized learner's self-directed process rather than external conditions. Many researchers developed learning strategy programs and demonstrated that those strategies enhanced learning.

However, learners often fail to use learning strategies. Garner (1990) pointed out the reasons why strategies are not used, and poor cognitive monitoring of learners was one of the most important reasons. Cognitive monitoring is the main function of metacognition. For this reason, the importance of metacognitive strategies has increased among learning strategies.

The attention process is the first step of information processing and also a vital stage of the learning process. However, we sometimes lose attention during the learning process. In the attention process, the awareness that one's attention is distracted makes it possible to regain attention. Thus, metacognitive monitoring and control over the attention process are needed.

However, the preexisting learning strategy programs had some limitations. Some programs treated 'paying attention' only in the context of environmental and motivation management, while others which treated 'paying attention' as one of the metacognitive strategies did not cover the keen monitoring and control over actual attention process. Therefore, in this study, we developed the Metacognitive Strategy Program on Attention Process focusing on the following two emphases. First, the program emphasizes a learner's self-directed metacognitive intervention. Second, the program highlighted the continuous monitoring and control in actual attention process.

Additionally, the program was designed for elementary students (4th grade ~ 6th grade). Kim(2005) described that many of the cognitive learning strategies such as rehearsal, organization, and elaboration strategies develop through age 6 to 12. However, Kim(2005) pointed out that students in senior years of elementary school can use these cognitive strategies, but 'not voluntarily'. This means that the development of metacognitive strategies is especially needed for the students of this age. Furthermore, academic tasks get more complicated in

4th grade ~ 6th grade, and the acquirement of metacognitive learning strategies at this stage also may affect further academic achievement in middle and high schools. For this reason, the Metacognitive Strategy Program on Attention Process focused on the elementary students who are in 4th grade ~ 6th grade.

Besides, Several previous studies suggested that superior learners already have various learning strategies, while poor learners do not have proper strategies or have difficulties in using strategies (Kim, 1999; Swanson, 1989). Since these studies also proposed that the learning strategies can be taught and trained, finally improving student's ability to use strategies, this study attempted to verify this notion by analyzing the respective effectiveness of the program in sub-groups (lower 50% group and higher 50% group).

Before a new learning strategy program is applied, acceptability of the program should be examined (Kim, 2005). Kim (2005) noted that confirming acceptability of a program means to examine whether the program is comprehensible and realizable in terms of cost, time and resources. To affirm the acceptability for future use of this program, the teacher who observed each session assessed the acceptability of the program. Also, to verify the students' acceptability for the program, assessment of the students' satisfaction was also examined.

The specific questions examined in this study were as follows:

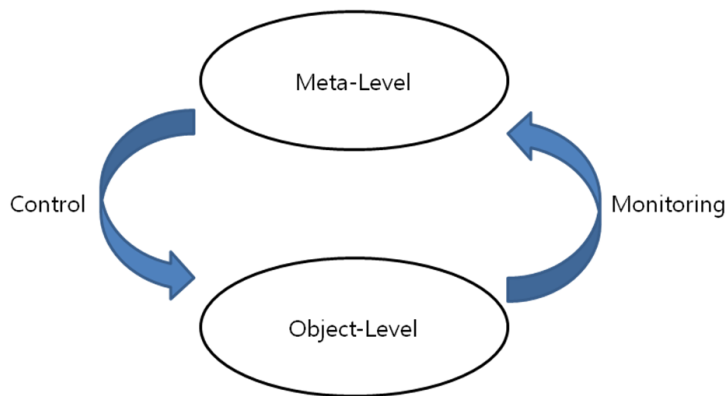
1. Is the Metacognitive Strategy Program on Attention Process for Elementary Students effective?
 - 1-1. Is the Metacognitive Strategy Program on Attention Process for Elementary Students effective for lower 50% group?
 - 1-2. Is the Metacognitive Strategy Program on Attention Process for Elementary Students effective for higher 50% group?
2. How is the program's acceptability examined by the teacher who observed each session?
3. How is the student satisfaction for the program?

II. Review of the Literature

1. Metacognition

Strategies improve learning. However, learners often fail to use these strategies. Garner (1990) discussed five reasons for failure in using strategies. The first reason is poor cognitive monitoring. Cognitive monitoring is one of the main functions of metacognition (Efklides, 2006).

Metacognition is a broad concept which includes both knowledge and regulation of cognitive activity (Fernandez-Duque et al., 2000). Metacognitive knowledge is knowledge people have about their cognitive abilities (“I have a bad memory.”), about cognitive strategies (“To remember a phone number I should rehearse it.”), about tasks (“Categorized items are easier to recall.”), and so forth (Flavell, 1979).



[Figure 1] View of metacognition (Fernandez-Duque et al., 2000)

Metacognitive regulation refers to processes that coordinate cognition. These include both cognitive monitoring (e.g., error detection, source monitoring in memory retrieval) and cognitive control (e.g., conflict resolution, error correction, inhibitory control, planning). In [Figure 1], cognitive processes are split into two levels: the meta-level and the object level. Metacognitive regulation is a meta-level system that modulates cognitive processes at the lower level (Fernandez-Duque et al., 2000).

Efklides (2006) mentioned that metacognition has a dual role: (a) It forms a representation

of cognition based on monitoring processes; and (b) exerts control on cognition based on the representation of cognition.

<Table 1> The facets of metacognition and their manifestations as a function of monitoring and control (Efklides, 2006)

Monitoring		Control
Metacognitive knowledge	Metacognitive experiences	Metacognitive skills
Ideas, beliefs, 'theories' of	Feelings	Conscious, deliberate activities and use of strategies for
Person/Self	Feelings of familiarity	Effort allocation
Task	Feelings of difficulty	Time allocation
Strategies	Feelings of knowing	Orientation/monitoring of task requirements /demands
Goals	Feelings of confidence	Planning
Cognitive functions (e.g., memory, attention, etc.)	Feelings of satisfaction	Check the regulation of cognitive processing
Validity of knowledge	Judgments/estimates	Evaluation of the processing outcome
Theory of mind	Judgment of learning	
	Source memory information	
	Estimate of effort	
	Estimate of time	
	Online task-specific knowledge	
	Task features	
	Procedures employed	

In this study, the term metacognition is defined as meta-level activity which has two functions: metacognitive monitoring and control.

2. Attention Process

Attention is the first step in the memorization process (Lee et al., 2003). Likewise, attention in a learning situation enables reception of the contents and further information processing. Thus, ability to control attention directly influences the efficiency in information processing and improvement in learning (Yoon et al., 2007).

Attention is defined both in a passive and in an active way (Choi & Lee, 2006). In a passive way, attention means the delivery process of information from sensory organs to the cerebral cortex, which is the center of cognitive activity. This definition is similar to that of 'perception'. On the other hand, in an active way, attention is defined as a process in which information is selected and processed actively. Without active attention, any stimulus (information) cannot remain. Thus, active attention is needed in learning situations. It is generally accepted that

attention can be improved through training and practice. For the necessity mentioned above, the Metacognitive Strategy Program in this study specially focused on the attention process.

3. Metacognitive Monitoring and Control over the Attention Process

Meichenbaum (1977) realized that adults monitor their own attention and make corrections when attention wanders. Impulsive children, like very young children, do not successfully analyze their experiences in cognitively mediated terms. To compensate for this deficit, Meichenbaum proposed a self-instructional procedure in which an adult models a task while talking to himself out loud. Then, the child performs the same task under the adult's direction. Next, the child performs the task while instructing himself — first aloud and then by whispering. Finally, the child performs the task, guiding his performance independently via private speech (Meichenbaum, 1977).

Similar research about training in control over the attention process was performed by Hallahan et al (1979). The study concluded that the training of self-monitoring on attention led to high levels of on-task behavior and academic output. In this study researchers used an audio tape recorder to cue the subject's self-recording. Moreover, without a tape recorder (only self-recording) the subject maintained high levels of on-task behavior and academic output.

Miller & Bigi (1979) suggested that meta-attention, or an individual's understanding of the attention process, undergoes qualitative changes with development. The conclusion of their study indicated that fifth-grade children were more likely to perceive the importance of internal variables — such as interest or concentration — than first- and third-grade children — who valued external variables, such as the elimination of distraction — as most relevant to attention. Loper & Hallahan (1982) concluded similarly that interest was more impressive to older children and external distraction and reward more impressive to younger children. This means that perception about attention changes with development from passive to more active and self-leading perceptions. Loper & Hallahan (1982) also showed a significant but weak relationship between meta-attention and achievement.

In sum, the attention process is a vital stage of the learning process, and metacognitive monitoring and control are essential requirements for the use of other learning strategies.

Considering all the necessities mentioned above, the Metacognitive Strategy Program on Attention Process for Elementary Students was organized and the effectiveness of the program was examined in this study.

4. Learning Strategy Programs in Korea

<Table 2> shows the list of the mostly quoted learning strategy programs, which are provided by National Assembly Library and Korea Education & Research Information Service, from 1990 to 2004 in Korea (Kim, H., 2005). In most of the program, activities related to concentration or paying attention are included in 'the learning environment management' session. For example, Kim (1998) offers an activity in which students discuss the motivational and environmental factors improving or hindering concentration. Although motivation and learning environment management are important factors which affect the attention, more emphasis on learner's self-directed metacognitive monitoring and control over the cognitive process is needed.

On the other hand, Park (2004) and Kim (2003) cover the activities about 'paying attention' as one of the metacognitive strategies. However, the actual activity is either to focus on the goal why they need to learn (Park, 2004), or to aware one's mistake in English use and memorizing them (Kim, 2003). In both cases, the learner's self-directed use of metacognition is emphasized, but the keen monitoring and control which have focus on actual attention process are not treated.

<Table 2> Learning Strategy Programs in Korea (Kim, H., 2005)

Program	Researcher	Subject	Contents
Learning Strategy Program	Y. C. Kim (1992)	High school students	<ol style="list-style-type: none"> 1. Developing learning attitude: time-management, concentration 2. Memorizing facts: peg-word, placing the meaning, chaining 3. Comprehending themes: using visual image, questioning, reasoning, finding core ideas 4. Comprehending chapters and a book: utilizing graphics, how to read 5. Note-taking strategy 6. Preparation for an exam 7. Logical thinking 8. Creative thinking

Program	Researcher	Subject	Contents
Effective Learning Consultation	Y. J. Kim (1998)	Under-achieving adolescents, teachers, parents	<ol style="list-style-type: none"> 1. Enhancing motivation 2. Time-management 3. Improving concentration 4. Guiding how to read 5. Improving memory 6. Note-taking 7. Preparation for an exam
Developing teaching-learning materials for underachieving elementary students	Korea Institute for Curriculum and Evaluation Research Report CRC 99-2	Underachieving 4th ~ 6th grade elementary students	<ol style="list-style-type: none"> 1. How to enhance the motivation <ul style="list-style-type: none"> - Improving self-esteem - Changing attribution - Developing self-regulatory skills 2. Management strategy <ul style="list-style-type: none"> - Time-management and forming habits - Managing learning environment 3. Learning strategy <ul style="list-style-type: none"> - Paying attention - Memory strategy - Elaborating strategy - Preparation for an exam 4. Task specific strategy <ul style="list-style-type: none"> - Effective reading - Math problem solving strategy
Self-Regulator Training Program	Y. H. Yoon (2002)	Middle & high school students	<ol style="list-style-type: none"> 1. Building rapport & self test 2. Setting goals and planning: time-management, planning daily schedule, learning plans 3. Managing environment: self-check up, factors improving or hindering concentration 4. Rehearsal, memorization, and review: memorizing skills, elaboration and systematization, recitation 5. Systematization: checking reading skills, questioning, recitation, review 6. Record: note-taking 7. Seeking information: preparation for an exam, how to take an exam, attribution analysis 8. Evaluation: self-encouragement, self-fulfillment prophecy
English Vocabulary Learning Strategies	Y. J. Park (2004)	High school students	<ol style="list-style-type: none"> 1. Memorization strategy <ul style="list-style-type: none"> - Mind-map, classification, association of ideas, using image, using physical sensory response 2. Cognitive strategy <ul style="list-style-type: none"> - Rehearsal, note-taking 3. Replacement strategy <ul style="list-style-type: none"> - Guessing, body language, using a coined

Program	Researcher	Subject	Contents
			word
			4. Metacognitive strategy - Paying attention, setting goals, evaluation
			5. Emotional strategy - Allaying anxiety, self-applause
			6. Social strategy - Questioning, collaborating with others
Self-Directed Learning Strategy Training Program	J. S. Kim (2003)	Elementary students	1. Memorization strategy - Building connections, learning vocabulary in the context, using sound, review
			2. Cognitive strategy - Repeating, practicing, understanding the rules, deductive reasoning, analyzing the vocabulary, summarizing, note-taking
			3. Replacement strategy - Guessing, using body language, synonym, using a coined word
			4. Metacognitive strategy - Using background knowledge, selective attention, setting goals, planning, self-monitoring, self-evaluation
			5. Emotional strategy - Allaying anxiety, self-applause
			6. Social strategy - Questioning, asking someone for help, collaborating with others
Self-Regulatory Learning Strategy Training Program	W. S. Oh (2004)	Elementary students	1. Self-evaluation
			2. Organizing and conversion
			3. Setting goals and planning
			4. Seeking information
			5. Keeping records and review
			6. Organizing environments
			7. Self-reinforcement and discipline
			8. Rehearsal and memorization
			9-11. Asking someone for help
			12-14. Reviewing the note
Self-Regulatory Learning Strategy Training Program	C. J. Lee (2003)	Middle and high school students	1. Making learning environment
			2. Setting goals
			3. Planning
			4. Seeking information
			5. Organizing the contents
			6. Memorization
			7. Asking someone for help
			8. Reviewing
			9. Evaluation
			10. Praise
			11. Discipline

Furthermore, commercially published learning strategy programs were also analyzed. In the program of Byeon & Park (2004), 'concentrating attention' is included as a part of "information process skills". To improve concentration, the program suggested learning environment management, checking physical conditions, and planning tasks. Like the cases in the formerly mentioned programs, the learner's actual metacognitive intervention in attention process was not considered in this program.

The attention enhancing strategies in the program of Choi & Lee (2006) consist of two parts; visual attention enhancement and auditory attention enhancement. This program provides plenty of attention practices using visual and auditory stimuli. However, Choi & Lee mentioned the limitation that the effectiveness of the program was not empirically verified.

Considering the limitations of preceding learning strategy programs, the Metacognitive Strategy Program on Attention Process was developed focusing on the following two emphases. First, the Metacognitive Strategy Program on Attention Process emphasizes a learner's self-directed metacognitive intervention. Second, the program spotlighted the continuous monitoring and control in actual attention process.

5. Theoretical Basis of the Program

The Metacognitive Strategy Program on Attention Process consists of three sessions; the self-instructions and self-recordings, visual attention training, and auditory attention training. First of all, the idea of self-instructions and self-recordings is derived from the findings of Meichenbaum (1977). Meichenbaum developed the self-instructional training, which is an effective method of behavior modification. In the self-instructional training, children are trained to say the modifying self-talk — first out loud then within themselves. Based on Meichenbaum's self-instructional training, the first session of the Metacognitive Strategy Program on Attention Process was composed of self-instructions and self-recordings about metacognitive monitoring over the attention process. The monitoring of the attention process means to aware of one's own attention process. To regain attention, one should first be aware that one's attention is distracted. A learner's self-instructions include saying 'No!' to him/herself when irrelevant thoughts pop up or he/she wants to leave their seat while the whole class reads a short fairy tale. Self-recording is to put a sticker on the self-record sheet every time he/she says 'No!' to him/herself. To encourage the students to follow the directions, the teacher mentions

that the results of self-recording have nothing to do with any assessment of the student and rewards. Through this activity, students can metacognitively monitor their own attention process. Also, by visual records (the sticker on the worksheet), students can self-evaluate their cognitive activity. This self-evaluation leads to students setting new goals and making a greater effort to do better.

The second and the third session of the program are visual attention training and auditory attention training. Since visual sense and auditory sense are the two main channels in learning situations (Choi & Lee, 2006), these two sensory stimuli were used in the second and the third session, respectively. The second session (the visual attention training) is composed of games in which students have to pay attention to the visual stimuli they need and memorize them. In the third session (the auditory attention training), while students listen to a story they are guided to imagine the later part of the story. The teacher stops reading the story before the story ends. Then the students write their own imaginative end of the story on a worksheet. In both the visual attention training and the auditory attention training, the metacognitive monitoring and control over their own attention during the activity is emphasized.

III. Method

1. Program Development

The purpose of this study is to explore the effectiveness of the Metacognitive Strategy Program on Attention Process, which is designed for elementary students. The program consists of three sessions (40 minutes for each session), and is focused on the monitoring of and control over the attention process. The contents were developed in consultation with three doctoral experts, with consideration of the preceding theoretical basis for the program

2. Subjects

The subjects of this study was 5th grade students of W and S elementary school in Seoul, Korea. Students from two classes of W elementary school (total 77 students) were assigned

to an experimental group, and one class of S elementary school (total 33 students) to a non-experimental group. To confirm that the change in the pre- and post-tests of the experimental group is due to the interventions, the same test was applied to the non-experimental group at two week intervals. However, the non-experimental group's data was not attained at the same time as the experimental group, so the history factor, which can diminish the internal validity exists.

<Table 3> Subjects

		N	%
Experimental	Male	41	53.2
	Female	36	46.8
	Total	77	100.0
Non-Experimental	Male	18	54.5
	Female	15	45.5
	Total	33	100.0

3. Assessment & Rating Scale

1) Assessment of Learning Strategies for Adolescents (ALSA)

Cognitive & Metacognitive Strategy (17 items), which is one of four areas of the Assessment of Learning Strategies for Adolescents (ALSA) was used for the pre- and post-tests. The Cognitive & Metacognitive Strategy of ALSA examines the learner's use of strategies concerning information process, metacognitive control, and regulation. The correlation between Cognitive & Metacognitive Strategy and the percentile rank of the students' academic achievement in school was .387 ($p < .01$). Also, the Cronbach's α of the Cognitive & Metacognitive Strategy was .839 (Kim, 2007).

2) Observer Rating Scale

Before a new learning strategy program is applied, acceptability of the program should be examined (Kim, 2005). Confirming acceptability of a program means to examine whether the program is comprehensible and realizable in terms of cost, time and resources.

To confirm the acceptability of the Metacognitive Strategy Program on Attention Process,

the teacher who observed each session rated on a 5-point Lickertis scale whether the program was comprehensible to both teachers and students and whether the program was realizable in normal classroom settings.

3) Student Satisfaction Questionnaire

The student satisfaction questionnaire (8 items) was developed based on the Client Satisfaction Questionnaire (CSQ) (Larsen et al., 1979).

4) Procedures

It took three weeks to run all three sessions (one session a week). The pre-test was conducted right before the first session started, and the post test and satisfaction questionnaire was conducted right after the third session ended. The interval between the first session and the last one was two weeks. Master's student who was versed in the contents of the program ran all the three sessions. The observer (the teacher who observed each session) was given the program manual before the first session and assessed the acceptability of the program right after each session.

<Table 4> Experimental Design

Experimental Group	O1	X	O2, S
Non-Experimental Group	O3		O4

O1, O3 : Pre-Test

O2, O4 : Post-Test

X : Intervention (Program)

S : Satisfaction Questionnaire

IV. Results

1. Cognitive & Metacognitive Strategy

1) Comparison of Changes in Pre- and Post-Test

Analysis of Covariance (ANCOVA) was used to even up the pre-test scores, and the two groups were compared in terms of their post-test scores.

<Table 5> Descriptive Statistics

	Pre-Test		Post-Test	
	Mean	SD	Mean	SD
Non-Experimental (N=33)	2.40	.41	2.33	.46
Experimental (N=77)	2.69	.45	2.79	.60

<Table 6> Summary Table for ANCOVA

Source	SS	df	MS	F
Pre-Test	18.55	1	18.55	128.44***
Group	.66	1	.66	4.54*
Error	15.45	107	.144	
Corrected Total	38.84	109		

(*** $p < .001$, * $p < .05$)

The post-test score of the experimental group was higher than that of the non-experimental group, and the difference was significant ($F=4.54$, $p < .05$). This result suggests that the Metacognitive Strategy Program on Attention Process has a positive effect on the student's use of cognitive & metacognitive strategies.

<Table 7> Estimated Marginal Means

	Pre-Test	Post-Test	
	Mean of Pre-Test Score	Adjusted Means	Standard Error
Non-Experimental (N=33)	2.60	2.53	.07
Experimental (N=77)		2.70	.04

2) Sub-Group Analysis

For further analysis, a total of 110 students were divided in terms of pre-test scores into two sub-groups; lower 50% group and higher 50% group. ANCOVA was performed for each sub-group. In the lower 50% group, the post-test score of the experimental group was higher than that of the non-experimental group, and the difference was significant ($F=5.46$, $p < .05$); but in the higher 50% group, the difference between the experimental group and the non-experimental group was not significant ($F=.44$, $p > .05$).

(a) Lower 50% Group

<Table 8> Descriptive Statistics of Lower 50% Group

	Pre-Test		Post-Test	
	Mean	SD	Mean	SD
Non-Experimental (N=27)	2.26	.30	2.19	.38
Experimental (N=37)	2.33	.32	2.46	.52

<Table 9> Summary Table for ANCOVA of Lower 50% Group

Source	SS	df	MS	F
Pre-Test	6.94	1	6.94	64.48***
Group	.59	1	.59	5.46*
Error	6.57	61	.11	
Corrected Total	14.63	63		

(***) $p < .001$, (*) $p < .05$)

<Table 10> Estimated Marginal Means of Lower 50% Group

	Pre-Test	Post-Test	
	Mean of Pre-Test Score	Adjusted Means	Standard Error
Non-Experimental (N=27)	2.30	2.24	.06
Experimental (N=37)		2.43	.05

(b) Higher 50% Group

<Table 11> Descriptive Statistics of Higher 50% Group

	Pre-Test		Post-Test	
	Mean	SD	Mean	SD
Non-Experimental (N=6)	3.01	.17	2.94	.19
Experimental (N=40)	3.03	.24	3.09	.51

<Table 12> Summary Table for ANCOVA of Higher 50% Group

Source	SS	df	MS	F
Pre-Test	1.54	1	1.54	7.60**
Group	.09	1	.09	.44
Error	8.70	43	.20	
Corrected Total	10.35	45		

(**) $p < .01$)

2. The Acceptability of the Program

Kim (2005) suggested that before applying a new learning strategy program, the program's acceptability should be confirmed. According to the notion of Kim (2005), confirming acceptability of a program means to examine whether the program is comprehensible and realizable in terms of cost, time and resources. To confirm the acceptability of the Metacognitive Strategy Program on Attention Process the teacher who observed each session rated on a 5-point Lickertis scale whether the program was comprehensible to both teachers and students and whether the program was realizable in normal classroom settings. The teacher assessed the acceptability of the program right after each session. The teacher reported that the program was not only teachable (Mean = 4.00) but also adequate for elementary students (Mean = 3.67).

3. Student Satisfaction

To verify the students' acceptability for the program, assessment of the students' satisfaction was also examined. The students in the experimental group rated on a 4-point Lickertis scale for 8 satisfaction question items. In general, the students reported that they were satisfied with the program (Total Mean = 2.99). Notably, they rated higher in items which asked about satisfaction at the amount of help (Item Mean = 3.21) and the general satisfaction (Item Mean = 3.14). On the other hand, they rated relatively lower in items which asked whether they had been in need of this kind of program (Item Mean = 2.76).

V. Discussion

The implications of this study are as follows.

First of all, this study showed the effectiveness and the acceptability of the Metacognitive Strategy Program on Attention Process, so it can be used properly in elementary classrooms. The attention process is a vital stage of the learning process (Choi & Lee, 2006; Yoon et al., 2007). To regain attention, however, one should first be aware that one's attention is distracted (Meichenbaum, 1977; Hallahan et al., 1979). This means metacognitive monitoring

and control over the attention process are keenly needed. Furthermore, metacognitive monitoring and control are essential requirements for the use of other learning strategies (Garner, 1990). The Metacognitive Strategy Program on Attention Process has a focus on metacognitive monitoring and control over the attention process, and therefore is worth being used in elementary classrooms.

Secondly, the result of this study indicated that the program was more effective for students who were poor at using cognitive and metacognitive strategies at first. Specifically, the improvement in lower 50% group students' use of cognitive and metacognitive strategies was significant, while the increase of the higher 50% group was not significant. Since the use of cognitive and metacognitive strategies is closely related to the students' academic achievement in school (Kim, 2007), the result of this study infers that the program can be especially useful to low-achieving students. Several previous studies suggested that learning strategies can be taught and trained, so a student's ability to use strategies can improve (Kim, 1999; Swanson, 1989). The result of this study reinforces the suggestions of these previous studies.

The suggestions for further research are as follows.

First of all, to overcome the drawbacks of the self-report test (ALSA, which was used as the pre- and post-test in this study, was a self-report test), task-performance tests should be considered. In the self-report test, researchers cannot definitely confirm the veracity of the subjects' responses (Shin & Choi, 2005). Therefore, a student's response may not reflect his/her actual use of cognitive and metacognitive strategies in learning situations. On the other hand, the task-performance test diminishes the possibility of discrepancy between the perception of performance and the actual performance.

However, metacognitive learning strategy includes metacognitive knowledge (i.e., ideas, beliefs, 'theories' of person/self, strategies etc.) (Efklides, 2006). This means that the result of the self-report test, which is the student's perception of performance, is meaningful by itself. Moreover, this study used ALSA, which has weak-points as self-report test, but partly can make up for it in terms of ALSA's criterion validity (Kim, 2007).

Secondly, the program's effect on actual academic achievement also should be verified, and follow-up tests are needed to examine the maintenance of effectiveness. In this study, the 'effectiveness' of the Metacognitive Strategy Program on Attention Process is derived from the students' increased use of cognitive and metacognitive strategies after the intervention.

However, improvement in academic achievement was not examined as the effectiveness of the program in this study. To reinforce the conclusion of this study, the program's effect on actual academic achievement also should be verified. Moreover, in this study, the program was run only for three weeks, and there were no follow up tests. Therefore, the maintenance of the effectiveness could not be confirmed. To confirm the maintenance of the effectiveness, follow-up tests are needed.

Moreover, in this study, a teacher participated in the sessions as an observer. This situation might affect the result of this study, thus, a replication study in which the teacher observes the class outside the classroom is needed. In such design, researcher can verify and ensure the sole effect of the program, eliminating the effect of observer.

Finally, self-monitoring, which teaches students how to pay attention, is most effective when combined with a curriculum that also teaches students what to pay attention to. Although several studies showed that self-monitoring of attention was effective in increasing on-task behavior (Meichenbaum, 1977; Hallahan et al., 1979), some researchers suggested that students must know what they should attend to rather than simply know they should attend more (Snider, 1987). It is obvious that knowing what to pay attention to is also a necessary ingredient for academic learning. Therefore, appropriate contents and strategies dealing with 'what to pay attention to' need to be developed.

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* 김동일: 서울대학교 교육학과 및 동 대학원을 수료하고 미국 미네소타 대학교 교육심리학과에서 학습장애 전공으로 석사, 박사학위를 취득하였다. 현재 서울대학교 교육학과 교수로 재직 중이며, BK21 역량기반 교육혁신 연구사업단 참여 교수로 있다. 주요 저서로는 「학습장애아동의 이해와 교육」, 「특수아동상담」, 「ADHD 학교상담」 등이 있다.

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주의집중 메타인지 학습전략 효과 검증

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학습부진에 대한 설명 중 전략-결손(strategy-deficit)의 개념은 변화 가능하며 교육적으로 중재가 가능한 요인이라는 점에서, 또한 학습자의 능동적인 역할을 강조하고 있다는 점에서 각광받고 있다. 그러나 종종 학습자들은 학습 과정에서 전략을 사용하지 않는다. 그 이유 중 하나는 인지적 모니터링(cognitive monitoring)의 부족이다. 인지적 모니터링은 메타인지(metacognition)의 주요 기능이며, 이러한 점에서 다양한 학습전략 중 메타인지 학습전략은 그 중요성이 강조되고 있다. 또한 인지 과정 중 주의과정(attention process)은 정보를 처음 받아들이고 처리하는 과정으로서, 이후의 인지적 처리과정의 기초이다. 이러한 점에서 주의과정에 대한 메타인지적 모니터링(monitring) 및 통제(control)는 이후의 학습 및 다른 여러 전략의 활용을 가능케 한다는 점에서 매우 중요하다. 본 연구에서 효과를 검증하기 위해 구성한, 주의과정을 중심으로 한 '초등학생을 위한 메타인지 학습전략'은 총 3회기로 구성되었으며, 주의과정에 대한 모니터링(monitring) 및 통제(control)를 주요 내용으로 한다. 사전 사후 검사로는 청소년 학습전략 검사(Assessment of Learning Strategies for Adolescents : ALSA)의 인지·초인지 전략 영역이 사용되었다. 분석 결과 사전검사점수의 영향을 통제하고 난 후에도 무처리 비교집단에 비해 실험집단의 사후검사 점수의 향상이 통계적으로 유의한 정도임을 알 수 있었다($F=4.54, p<.05$). 이를 통해, 본 연구에서 효과를 검증하고자 한 메타인지 학습전략이 학생들의 인지·초인지 전략 사용상의 향상에 긍정적인 영향을 미침을 확인할 수 있었다.

주요어 : 메타인지, 학습전략, 주의, 청소년 학습전략 검사, 자기모니터링, 통제, 초인지

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