Effects of the SMMIS Model- based Self-Directed Learning Program on Elementary School Students' Personality, Cognitive Regulation and Behavior Regulation Ability

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Abstract: The purpose of the study was to investigate the effects of the SMMIS model-based self-directed learning program on the Korean elementary school students' personality, cognitive regulation, and behavior regulation ability. The participants were 93 fifth graders in the H Elementary School in Seoul. They took part in the program for two years, from March 2016 to December 2017. The program was provided as a part of the regular curriculum of the school and the participants took part in total 105 class hours. The self-directed learning diagnostic test(Choi & Kim, 2017) was used to measure the participants' pre/post-test scores. The results showed that participants' post-test scores were improved in the all variables significantly($p<.05$). In conclusion, the SMMIS model-based self-directed learning program was effective for elementary school students' personality, cognitive regulation, meta-cognition regulation, and behavior regulation ability. The study suggested to overcome the limitations of traditional self-directed learning programs and to develop long-term and ongoing programs that can lead to changes in learners' actual behavior.

Keywords: Behavior regulation ability, Cognitive regulation, Personality, Self-directed learning, SMMIS

INTRODUCTION

Recently, 4C (Critical thinking, Creativity, Communication skills, Collaboration) is getting a lot attention as core competencies that the Fourth Industrial Revolution demands. In other words, it could be defined as the ability to newly reconstruct and integrate the established knowledge, and to create something valuable with cooperation. It is basically manifested with self-directedness.

Accordingly, the school education considers the Self-Directed Learning as the most effective paradigm for adjusting to mutational contemporary society. However, if we try to understand the Self-Directed Learning with the approach of the humanistic psychology, the learners might be neglected (or ignored), which then leads to more indifference to studying or less Self-Directedness. In other words, the Self-Directedness does not come out just by fostering the environments and imposing the importance of studying. For example, the claim of Rogers that 'the aims, contents, and methods of the learning are determined only by each learner, and thus instructions of teachers are not important (So, 1998)', could be misunderstood as the negligence and ignorance, or it could be misapplied to, such as "evening studying in schools" in South Korea.

Another problem is that in many cases, the attention to Self-Directedness mislead to one-time, short-term special lecture. However, just like the way the first time swimmer cannot just get into water, even if he or she took a lesson from the professional swimmers but without practicing, besides the lessons of good study strategies, learners need to practice and have opportunities of corrections with appropriate feedback.

Choi and Kim (2010) defines Self-Directed Learning as a leading process where leaners utilize their own material and human resources, based on the self-control and self-regulation. They also emphasize developing the intrinsic motivation, meta-cognition and behavior-regulation trainings as a practical strategy for SDL.

Cognitive regulation is a practical strategy, which is developed and improved by the rehearsal (i.e., reading loud or memorizing a word to memorize the learning contents), elaboration (i.e., connects prior information and new information), and organization (i.e., structural arrangements of the relations of learning contents). Meta-cognitive regulation is defined as planning and performing the tasks based on the awareness of what they know with monitoring and regulation. Behavioral regulation is defined as controlling their will and macro environments, and divided into action control, time and environment management, and help-seeking. Personality is defined

as thinking, attitudes and behavioral characteristics of individual, and among them, 7 factors (i.e., morality, responsibility, leadership, interpersonal relationship, diligence, sociality, and mental health) are known to affect learning (Choi & Kim, 2017).

The SMMIS (Self-motivation, Motivation, Meta-cognition, Interaction, Self-reflection) based Self-Directed Learning program, which was applied into the current study, was examined and developed based on the above mentioned conceptions and practical strategies. In other words, beyond just teaching effective learning strategies, the program consists of process of letting the learners to make those strategies as theirs and transforming them to fit their own styles. Especially, the current study tried to examined the effects of the program on the personality, cognitive and meta cognitive regulation ability and behavior regulation ability. Detailed research questions are as follows.

1) Is there any changes on the personality of the students participating in the SMMIS based Self-Directed Learning program?
2) Is there any changes on the cognitive and meta-cognitive regulation ability of the students of the students participating in the program?
3) Is there any changes on the behavior regulation ability of the students participating in the program?.

METHODS

Participants

Participants were 93 fifth graders in the H Elementary School in Seoul. They took part in the program for two years, from March, 2016 to December2017. The H Elementary School is providing self-directed learning program for fifth and sixth graders in a regular curriculum. Thus, they were selected as participants of study because long-term program operation and research are possible.

Composition and procedures of the Self-Directed Learning program

The Self-Directed Learning program was based on the SMMIS (Self-motivation, Motivation, Meta-cognition, Interaction, Self-reflection) model, which aims to improve students' self-directed learning ability in elementary, middle, and high school. The original program was revised and adjusted with the purpose of the current study. Table 1 and 2 indicated the contents of the whole program in each week.

The program was implemented from March, 2016 to December, 2017, twice a week and each for a length of 1 hour, in a total of 105 hours. Each session involves lecture, small group activities, and individual activities with handouts, discussion and so on. A teacher in charge the classroom assisted in the program.

Table 1. Summary of the program from March to December, 2016.

Week	Summary	Target variable†
1	Overview of the self-directed learning and self-directed learning test	
2	Analyzing oneself	MCR
3	Making goal of this semester	MCR
4	Strategies for time management	BR
5	Improving delayed gratification	BR, P-d
6	Post-it peer counseling	P-s, P-ir, P-l, P-mh
7	Improving attention	CR, MCR
8	Finding one's effective mnemonics	CR, MCR
9	Understanding environment management for studying	BR
10	Strategies for reading textbook, SQ3R	CR, MCR
11	Note taking strategy Ⅰ (finding retrieval cue, reorganizing sentences, using symbols)	CR, MCR
12	Note taking strategyⅡ(applied to textbook)	CR, MCR
13	Note taking strategyⅢ(group activities)	CR, MCR
14	Overcoming test anxiety	CR, MCR
15	Making plans for test and application	CR, MCR
16	Peer tutoring for each subject	CR, MCR, P-s, P-ir, P-l, P-r
17	Overview of the Self-Directed Learning program for second semester and self-directed learning test, suggesting goal	
18	Eliminating distractors for studying, Improving delayed gratification	BR, P-d
19	Needs for time managements, using planner	BR
20	Strategies for word learning (making a concept note and learning words using contexts)	CR, MCR
21	Making own planner for test	CR, MCR

	and application	
22	My own mnemonic (award champion in memorizing from individual and group activities)	CR, MCR
23	Strategy for preparing test Ⅰ (Note taking for target subject)	CR, MCR
24	Strategy for preparing testⅡ (make up questions for a test), appropriate test preparing and attribution style	CR, MCR
25	Subject-linked creative experience Ⅰ(Korean)	CR, MCR, P-mh
26	Subject-linked creative experience Ⅱ(Math)	CR, MCR, P-mh
27	Note taking strategies Ⅳ (phased underline training, capture the structure of the writings)	CR, MCR
28	Note taking strategies Ⅴ (restructure sentences, symbolization and acronymization)	CR, MCR
29	Note taking strategies Ⅵ (graphic organizer)	CR, MCR
30	Self-test in target subject & final review, self-directed learning test	CR, MCR

† Abbreviations

variables	Abbreviations	variables	Abbreviations
Morality	P-m	Sociality	P-s
Responsibility	P-r	Mental health	P-mh
Leadership	P-l	Cognitive regulation	CR
Interpersonal relationship	P-ir	Metacognitive regulation	MCR
Diligence	P-d	Behavior regulation	BR

Table 2. Summary of the program from March to December, 2017.

Week	Summary	Target variable†
1	Reflection of learning habit	MCR
2	Classroom manner	P-s, P-ir
3	My strength, from friends	P-s, P-ir
4	Strategies for improving interpersonal relationship I	P-m, P-ir, P-mh
5	Improving delayed gratification, planner for time management	BR
6	Real game! King of memory Ⅰ(monitoring mnemonic strategies)	CR, MCR
7	Real game! King of memory Ⅰ(application of mnemonic strategies)	CR, MCR
8	Note taking strategies Ⅰ (underline, restructure of sentences)	CR, MCR
9	Note taking strategiesⅡ (finding effective note taking way)	CR, MCR
10	Strategies for improving interpersonal relationshipⅡ	P-s, P-ir, P-m, P-r
11	Strategies for improving interpersonal relationshipⅢ	P-s, P-ir
12	Self-Controller	BR
13	Improving attention Ⅰ	CR, MCR
14	Improving attention Ⅱ	CR, MCR
15	Note taking strategies Ⅲ (making dictionary of knowledge on a wide variety of subjects)	CR, MCR
16	Simulation of self-study Ⅰ	CR, MCR
17	Preparing middle school students (introducing **Free semester system etc.**)	
18	Entrepreneurship	P-l
19	Strategies for test preparing Ⅰ(making planner & application)	CR, MCR
20	Strategies for test preparing Ⅱ(monitoring understanding aspect, wrong answer note)	CR, MCR
21	Simulation of self-study Ⅱ	CR, MCR
22	final review & completion ceremony, self-directed learning test	

Measures

To test the effects of the program, self-directed learning ability measurement scale developed by Choi

& Kim (2014) was administered before and after the program. The original scale includes personality, motivation regulation, cognitive and metacognitive regulation, behavior regulation, and career maturity, but only personality, cognitive and metacognitive regulation, behavior regulation were utilized in the current study. Personality consists 7 sub-factors of morality, responsibility, leadership, interpersonal relationship, diligence, sociality and mental health. Cognitive regulation consists 3 sub-factors of rehearsal, elaboration, and organization. Metacognitive regulation consists 3 sub-factors of planning, monitoring, and regulation. Behavior regulation consists 3 sub-factors of behavior control, time/environment management, and help seeking. Answers were measured with 4-point likert scale and higher score indicated higher ability.

Procedure and analysis

The pretest was administered in March, 2016, with offline manner, before the program started. The posttest was administered in December, 2017, with online system, after the program ended. The same questionnaire was used in both pretest and posttest. Analysis was conducted with SPSS-PC software (version 25.0 for Windows, United States, IL) and paired t-test were conducted. Two-tailed p-values below 0.05 was considered as statistically significant.

RESULTS

Changes in personality

The sum of 7 sub-factors personality was increased by 18.7 points between the posttest and pretest, and paired t-test showed the difference was significant ($p < .05$). However, examining the difference in 7 sub-factors, the increases in leadership, interpersonal relationship, diligence and sociality were significant but the increases in morality, responsibility and mental health were not significant (see Table 3).

It could be assumed that the morality, sociality and interpersonal relationship would be improved through the program stressing the aspects of improvement of relationship with family, teacher, and friends, values on cooperation, and communication. In addition, responsibility and diligence would be improved by the program of stressing the goal setting, planning, and self-control. And leadership would be developed through the entrepreneurship lecture.

Students answered “I could spend more time in communication with friend”, “I could understand my friends more than before”, “I became more diligent than before”, “I was not confident, but it was good to say each other’s strength”, “I recognized the importance of cooperation and communication through the activity of making marshmallow tower”, “My perseverance has been improved with the struggling in spite of difficulties” in the survey of satisfaction for the program, indicating that the students also were aware of their improvement.

On the other hand, the sub-factors of morality, responsibility and mental health that showed no significance need further investigation. Discussion about these results were presented in the discussion and implication section.

Table 3. Comparison of scores of personality between the pre-test and post-test

(N=93)

Measured factor		M	SD	t	p
Personality (total)	Pre	523.2	56.7	-3.402	**.001**
	Post	541.9	67.6		
Morality	Pre	76.8	10.4	-.755	.452
	Post	77.6	12.1		
Responsibility	Pre	70.9	10.7	-.367	.715
	Post	71.5	11.7		
Leadership	Pre	72.5	11.0	-4.709	**.000**
	Post	78.0	11.2		
Interpersonal relationship	Pre	73.3	8.0	-2.166	**.033**
	Post	75.4	8.8		
Diligence	Pre	73.1	12.4	-2.406	**.018**
	Post	76.6	12.8		
Sociality	Pre	76.3	11.1	-3.401	**.001**
	Post	80.2	11.6		
Mental health	Pre	79.8	11.2	-1.763	.081
	Post	82.3	14.3		

Changes in cognitive and metacognitive regulation

The mean score of cognitive and metacognitive regulation was increased by more than 8 points between the posttest and pretest, and paired t-test showed the difference was significant ($p < .05$). It could be assumed that the program provides individualized deepening curriculum, repeated training in spiral approaches to habituate note taking strategies, mnemonics, and strategies for test preparing. In addition, at the end of the note taking, program provided the opportunities for personalized learning strategies through the process of finding their interests and summarizing structures (making dictionary of knowledge on a wide variety of subjects) (see Table 4).

Students answered “I could shorten the study time by making structure of learning contents, and it helps memorization”, “I could find the most effective way to memorize”, “I became a person who makes plan before preparing test” in the survey of satisfaction for the program, indicating that students were also aware of the effects of organizing personalized learning strategies.

Table 4. Comparison of score of cognitive and metacognitive regulation between the pre-test and post-test

(N=93)

Measured factor		M	SD	t	p
Rehearsal	Pre	61.5	21.0	-5.115	**.000**
	Post	72.5	14.2		
Elaboration	Pre	66.8	16.7	-4.748	**.000**
	Post	75.3	13.0		
Organization	Pre	64.5	20.6	-3.920	**.000**
	Post	73.7	13.4		
Planning	Pre	66.1	17.4	-4.281	**.000**
	Post	74.0	14.6		
Monitoring	Pre	69.5	16.6	-3.624	**.000**
	Post	76.2	15.2		
Regulation	Pre	68.1	15.8	-4.384	**.000**
	Post	74.6	13.1		

Changes in behavior regulation

The mean score of behavior regulation was increased by 6 points between the posttest and pretest. The paired t-test showed the differences in all sub-factors were significant ($p < .05$); $p = .018$ for behavior control, $p = .000$ for time/environment management, and $p = .012$ for help seeking. It could be assumed that the lecture for improving studying environment or time management, self-control would help students control and regulate oneself continuously. Especially, the training that analyzes 24 hours spending patterns with the time management planner and the training that improve delayed gratification for distractors, including mobile phone, game, watching TV , were effective. Letting the students who showed difficulties in using planner set small goals and achieve it step by step, or provide them to divide planning by one week, may decrease psychological burden (see Table 5).

Students answered “I could spend more time for studying by effective time planning”, “I could spend time more efficiently with the planner”, “I recognized I could endure something difficult too” in the survey of satisfaction for the program, indicating that students learned about the self-regulation strategies through the program.

Table 5. Comparison of scores of behavior regulation between the pre-test and post-test

(N=93)

Measured factor		M	SD	t	p
Behavior control	Pre	66.2	18.2	-2.406	**.018**
	Post	71.0	14.8		
Time/environment management	Pre	63.0	20.1	-4.200	**.000**
	Post	72.4	15.7		
Help seeking	Pre	67.4	18.2	-2.566	**.012**
	Post	72.3	12.5		

CONCLUSION AND SUGGESTION

The purpose of this study was to examine the effects of SMMIS based Self-Directed Learning programs on the personality, cognitive and meta-cognitive regulation, behavior regulation. For the purpose, detailed research questions were as follows: (1) Is there any changes on the personality of the students participating in the SMMIS based Self-Directed Learning program? (2) Is there any changes on the cognitive and meta-cognitive regulation ability of the students of the students participating in the program? (3) Is there any changes on the behavior regulation ability of the students participating in the program?

The results revealed that the SMMIS based Self-Directed Learning programs increased the personality, cognitive and meta-cognitive regulation of students. It means that they could have ‘autonomy’ in setting the learning goals, choosing the learning strategies, actual practicing, and self-reflection.

The implications of the current study are as follows. First, the program overcame the limitations of the other prior Self-Directed Learning programs that they were one-time and short-term special lectures With the long-term program, we could identify the actual behavior changes. It gave the participants the opportunity to ‘Habituate’ and ‘Self-directing’ what they learned.

Second, with the 2-year program processing, by coordinating the leaning contents according to the learner’s pace of understanding and demands, it could lead to motivating and concentrating more effectively. Especially, making dictionary of knowledge on a wide variety of subjects would make the students who were not interested in note-taking, to explore the subjects they are interested in, and to reconstruct them.

Third, by visiting the teachers in charge, it could make times to understand the contents of the program, and thereby they could apply the program into their own subject curriculum. In other words, the students got feedback about note-taking strategy or SQ3R, delay of gratification, and planners from the teachers in charge when they attended to the normal curriculum. It means that the formal sessions were 105 hours in total, the actual effects of the programs were more than it.

Fourth, in the current study, among the sub-factors of personality, there were no differences in the morality, responsibility, and mental health. It might be that the main proportion of contents of the program were about cognitive and meta-cognitive regulation and behavior regulation, rather also for personality. Also for the external reason, the subject H elementary school is a private school, which is more applying pressure on academic achievement, which might hamper the morality and responsibility of the students just like the study of Lee (2013) shows. Thus, it implicates that for the positive changes of morality, responsibility and mental health, beyond the providing superficial programs, the atmosphere of schools and the guiding of teachers should also be changed. Also, to increase the morality and responsibility, it is important to implanting empathy and altruism for the students (Song, 2002). More future research is needed in the detailed practical strategy and the contents of the program especially with the domain of morality and responsibility.

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