A Thinking/Learning Skills Program for the Gifted

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The important role of metacognition (i.e. higher-order thinking processes) in cognitive development and academic learning has been emphasized by many researchers of different disciplines (e.g. Adey & Shayer, 1994; Paris & Winograd, 1990). With respect to the gifted field, there is strong theoretical support and research evidence indicating superior metacognitive and thinking ability as an essential component of giftedness (Cheng, 1993; Shore & Kanevsky, 1993). The question that follows is: Can gifted children's metacognitive and thinking skills be enhanced through intervention? The purpose of this paper is to illustrate the positive values of metacognitive intervention for gifted learners. First, we briefly review theories and research on the relationship between metacognition and giftedness. We then describe an instructional approach to enhancing thinking and learning. The approach, Strategies Program for Effective Learning/Thinking(SPELT), developed by our research team the University of Alberta, Canada, aims at fostering strategic learning and thinking in students (Mulcahy, Marfo, & Peat, 1984; Mulcahy, 1991). While this intervention program can be used with students of different ability levels, research evidence, as we will discuss later, has shown that it has particular relevance to the gifted population.

Metacognition, Thinking Processes, and Giftedness

Metacognition involves thinking about one's own learning, remembering, and understanding. There are two major components most theorists would now agree that make up metacognition (e.g. Paris & Winograd, 1990). They are: (1) knowledge about one's own cognitive resources, task demands and about strategies needed to perform tasks effectively, and (2) the control of this knowledge. The highly metacognitive individual is depicted as one who has extensive knowledge regarding various stategies available to them as well. Furthermore, one of the more critical defining characteristics of a highly

metacognitive individual is the regulation and evaluation of this knowledge. This regulation component of metacognition relates to an individual's ability to manipulate and control their own cognitive resources and strategies to ensure successful completion of a task. These two aspects of metacognition have often been implicated in the contemporary conception of giftedness.

Metacognition as a Key Component of Giftedness

Contemporary theorists of giftedness place great emphasis on higher-level cognitive processes in understanding giftedness (Sternberg & Davidson, 1986). In particular, many cognitive theorists argue for metacognition as a key feature distinguishing gifted people from others. For example, Jackson and Butterfield (1986), based on their review of the empirical literature on cognitive processing in the gifted, suggested that "superordinate processes regulating task analysis and self-management of problem-solving behavior may be important components differentiating gifted from average performance" (p.176). Similarly, Borkowski and his associates (Borkowski & Peck, 1986; Borkowski, Carr, Rellinger, & Pressley, 1990) contended that metacognitive theory is particularly suited for understanding more about the interdependence of motivation, attitudes, and cognition in the gifted. Viewing giftedness from a developmental perspective, they pointed out that fast processing speed and superior sensory -based skills characteristic of young gifted children set the stage for the development of mature self and metacognitive systems. They believed that parents, in responding to their gifted youngsters' early signs of perceptual efficiency, play a critical role in promotiong the development of high self-esteem and greater metacognitive awareness by providing greater intellectual stimulation. An integrated pattern of motivational and metacognitive system, suggested the authors, is what sets gifted children apart from others and eventually leads to outstanding performance.

Within the field of gifted education, a popular definition of giftedness is put forth by Renzulli (1986). His definition revolves around three major aspects; high ability, creativity, and task commitment. First, Renzulli's view of high ability includes the capacity to process information, to integrate experiences, to engage in abstract thinking, and more

specifically, the capacity to acquire knowledge and skills in a specialized field. Second, creativity refers to originality of thinking and constructive ingenuity. Finally, task commitment means high intrinsic motivation. Although metacognitive terms are not used in Renzulli's definition of giftedness, further analysis reveals that his emphasis on thinking skills and motivation parallel Borkowski et al.'s conception of giftedness in that both depict the gifted individual as one who is highly efficient in the coordination and regulation of their cognitive and motivational processes.

In short, many current conceptions of giftedness emphasize the important role of metacognition in giftedness. Is the position supported by empirical research? Major research findings are highlighted in the following section.

Metacognitive and Thinking Processes in the Gifted

In an earlier review of research in thinking processes in the gifted, Rogers (1986) reported that the gifted display significantly more metacognitive skills in problem solving in comparison to their aged peers. In particular, gifted learners are more accurate in identifying the problem to be solved, select representation of information in way more similar to those of the experts, and are more capable in setting priorities and allocation resources for problem solving. Moreover, they generate solution steps more readily and spontaneously, and keep track of the solutions more systematically.

Roger's (1986) conclusion about gifted learners' advanced metacognitive skills and thinking abilities is further substantiated by a more recent review by Shore and Kanvesky (1993). Analyzing the findings of research studies of the gifted with a focus on recent and ongoing research into cognitive processes, Shore and Kanvesky reported that there are seven principal ways in which the thinking processes of gifted individuals differ from those of other people. First, in terms of memory and the knowledge base, gifted students know more and also know better how to use what they know. Second, with respect to procedural knowledge, experts and able students employ more elaborated procedures or strategies. Third, high ability students monitor and guide their own thinking processes more often when they engage in challenging activities. Fourth, gifted learners spend

more time on higher-order planning but execute solution steps more efficiently in problem solving. In addition, gifted learners and experts represent and categorize problems differently from average students and novices. Furthermore, gifted individuals are more flexible in adopting alternative strategies in problem solving and are more capable to see alternative representations of a problem. Finally, gifted learners perfer more complex and demanding problems to simple ones.

The reviews offered by Rogers (1986) and Shore nad Kanvesky (1993) thus provided strong evidence indicating gifted individuals' more mature metacognitive skills and sophisticated thinking processes. One might question the utility of metacognitive instruction or thinking skills training for gifted children in view of their more developed metacognitive and thinking abilities. Further analysis of research findings in the gifted literature, however, reveals that gifted children's metacognitive and thinking skills can be further enhanced with appropriate interventions.

Developmental/Intervention Studies with the Gifted

Why do gifted children display a higher level of metacognitive and thinking skills? Tracing the social origins of metacognitive development, Borkowski and Peck (1986), as mentioned earlier, speculated that parents of gifted youngers provide extra intellectual stimulation that leads to the development of a more mature and integrated metacognitive system. Such a position seems to gain support from a study carried out by Moss (1990) who looked into the metacognitive development of the gifted during preschool years. In this study, Moss examined the exchanges between mothers and their gifted or nongifted preschoolers during a joint play problem-solving situation. It was observed that mothers of gifted preschoolers were significantly more likely to model metacognitive strategies and initiate sequences of metacognitive exchanges. Moss therefore suggested that "differences between gifted and average-ability children in metacognitive skills, may, in part, be rooted in social interaction" (p. 19). The results of this study indicates adult guidance and modeling contributes to the advancement of metacognitive and thinking skills in the gifted. The implications here for intervention in developing the metacognitive abilities of gifted students

appears be evident.

While Moss' (1990) study indicated the potential benefits of metacognitive interventions, the research conducted by Scruggs and his associates (e.g., Scruggs, Mastropieri, Jorgensen, & Monson, 1986; Scruggs, Mastropieri, Monson, & Jorgensen, 1985; Scruggs & Mastropieri, 1988) further demonstrated that gifted students can actually benefit from specific strategy training. The Scruggs group have carried out a series of investigations involving mnemonics (i.e., memory-enhancing strategies) with gifted learners. One of their specific focuses was the keyword mnemonic strategy which utilizes auditory and visual imagery cues to enhance factual associations. For example, in learning the Spanish word *poto*, which means *duck* in English, learners would relate *pato* to the keyword *pot,* which is an acoustically similar and easily pictured word to its English equivalent duck, by picturing a duck with a pot on its head (Scruggs et al., 1985). In their research, the mnemonic keyword strategy was taught to a variety of gifted and nongifted populations. They found that both gifted and nongifted students benefited from memory strategy instruction as early as fourth grade. However, gifted students benefited much more from the use of mnemonic strategies; strategy instruction widened the gap between the performance levels of the gifted and average peers. Of particular interests were the results demonstration that only the gifted students were able to transfer the keyword strategy spontaneously and successfully to another content area. The researchers argued that their findings pointed to the need for specific strategy instruction with gifted students to maximize their learning.

The foregoing discussion shows the close relationship between metacognition and giftedness. More importantly, research evidence indicates that gifted children can benefit from metacognitive instruction. There are a number of programs and approaches designed to foster metacognitive and thinking skills in gifted children (Shore & Kanvesky, 1993). For the past ten years we have been working on the development and evaluation of an instructional approach to teaching metacognitive and cognitive strategies along with the control and regulation of affect and motivation. The approach, called Strategies Program for Effective Learning and Thinking (SPELT) has as

its goal the development of students' strategic learning and thinking thereby enabling them to become more autonomous learners. This program has been applied to the gifted population and the results are very encouraging. A description of the program and its effects on gifted students will be reported in the following sections.

SPELT: Its Relevance to the Education of the Gifted

A brief description of program characteristics, instructional methods and teacher training procedures of SPELT, with a focus on its relevance to the education of the gifted, will be presented here (see Mulcahy et al., 1984; Mulcahy, Andrews, & Peat, 1989: and Mulcahy et al., 1993, for further information about the program).

Program Characteristics

SPELT translates aspects of contemporary cognitive psychological theory and research into a practical and easy-to-implement instructional program which seeks to train children to become active and purposeful learners, thinkers, and problem solvers.

While many existing cognitive strategy programs focus on high school and college students, one major characteristic of SPELT is that it was initially developed for chidren in upper elementary and junior high school grades. Although SPELT has also been extended to high school and college populations, its initial development with a special emphasis on elementary grades indicates that it is particularly suitable for gifted children who show early signes of exceptional capabilities. To enable the gifted child to fully develop his/her potential, it makes sense that potentially valuable interventions be instituted as early in the child's school life as possible. SPELT with its emphasis on metacognitive intervention at an early age appears to meet the educational needs of gifted children.

Another characteristic of SPELT indicating its suitability for gifted learners is its active involvement of the learner in the instructional process. As pointed out by Borkowski et al. (1990), "gifted performance is characterized by high self-esteem, intrinsic motivation, and effort-related attributional beliefs" (p.67). Kanevsky (1992) also found that while young gifted children may need adult guidance in the early stages of problem solving, they prefer to work on their own

as they progress. In other words, these researchers emphasize the active role of the gifted child in the process of learning. The dominant model in the majority of cognitive and metacognitive instruction approaches, however, has been the instructional system assigned or teacher imposed. Typically, the strategies are designed and tested by experts and then taught to students as recipes for dealing with a variety of problems. Within this framework there is virtually no opportunity for students to participate in determining which cognitive or metacognitive strategies are appropriate for different purposes and varying conditions. This approach also reinforces a passive learning approach as well as reinforcing an external locus of control both of which run counter to the development of an autonomous or self regulating learner.

On the contrary, the SPELT approach we have been developing utilizes a model of instruction in which the student is ultimately given the responsibility of determining if a strategy is needed, what strategies are appropriate, and how to generate, implement and evaluate them in a way that maximizes problem solution. Cognitive and metacognitive strategies are viewed in our approach as internally organized skills or control processes by which individuals regulate their behavior (both affective and cognitive). An individual's knowledge base regarding cognitive and metacognitive strategies and procedures for utilizing these along with the knowledge of what, when, where and why to utilize a particular strategy or combination of strategies is seen as the vehicle by which the individual may become a self-regulated learner.

SPELT differs from other learning/thinking strategies programs in yet another way. Many cognitive education programs, including those for the gifted, have been designed as structured packages to be taught independently of existing curriculum content or subject matter. In contrast, an important philosophy underlying the SPELT approach is that the teaching of strategies should take place within content and not as an independent or isolated curricular activity. This in-content approach allows strategy instruction to take place in the regular classroom where high-, medium-, and low-achieving students benefit from the strategic behavior of one another. On the other hand, it can also be integrated with special programs for the gifted where advanced courses or enrichment

activities are implemented. The flexibility of the SPELT approach to be integrated with regular school curricula or special programs thus further demonstrates its suitability for the education of gifted students.

Instructional methods

Within the SPELT approach we have imbedded a general teaching orientation in which the teacher's goal in all planning and instruction is to actively involve the student in their learning. The teacher acting as a mediator or facilitator in the learning process attempts to have students become more aware of their own cognitive and metacognitive process as well as aware of their motives and affect as it affects their learning. In action as a mediator the teacher leads students to discover and deduce rather than teaching facts to them as well as constantly challenging students to be more critical, systematic, evaluative and strategic in their behavior and attitude towards learning.

How can the teacher be successful in acting as a mediator? We incorporated three major types of instructional methods into the program to nurture the students' learning and motivation which would lead to self regulated learning (Mulcahy et al., 1984). The first type is direct instruction and explanation of learning strategies which may help children modify incomplete or erroneous theories they may hold with respect to self-regulated learning. The second type of instruction emphasizes peer tutoring and dialogues about learning. Instruction here also may involve Socratic dialogues, apprenticeship models and dialogical learning. The third category of instruction involves cooperative learning involving group discussion argument, and co-construction for appropriate cognitive and metacognitive strategies. These three types of instruction have recently been suggested to be effective innovative methods to assist teachers in developing self-regulated learners (Paris and Byrnes, 1989).

With these three types of instruction integrated into our program, the instructional approach involves a progression from the lowest level of strategy acquisition (teacher imposed) to the highest level (student self-generated). Accordingly, we have developed three phases of instruction in which the teacher taking the role of a mediator assists the students in

becoming increasingly more in control of the learning process leading them ultimately to autonomous learning.

The first phase of instruction involves the direct teaching of cognitive and metacognitive strategies which are program recommended, teacher identified or teacher-generated. This phase of the instruction approach has as its goals, the development of a repertoire of metacognitive and cognitive strategies, along with making students more aware of the benefits of strategic behavior. As well an emphasis in the instruction here is on developing positive perceptions of self competence along with attributional beliefs which emphasize personal control and competence. During this phase of instruction the source of control of the strategies resides with the instructor.

Some researchers have criticized cognitive strategy instruction approaches as involving the mere memorization and rote learning of strategy steps and application. If instruction were to remain at this first level, it is possible that it would encourage many of the negative characteristics of learning such as, passivity and external locus of control. However, it should be noted that "recent research,...indicates that the process of knowledge transformation and construction occur even when children enagage in drill-and-practice activities" (Harris & Pressley, 1991, p.393). With respect to the gifted population, although research findings have indicated that gifted students as a whole, in comparison to average students, utilize cognitive and metacognitive strategies more frequently and more effectively, it should be noted that not all gifted students are alike and there are still rooms for improvement, indication the need for direct strategy instruction even for gifted learners (Risemberg & Zimmerman, 1992). More importantly, our approach includes two more advanced phases of instruction which assure the student's active role in the process of learning.

The second phase of instruction in the SPELT approach is what might be considered the transfer and generalization phase. Instruction here emphasizes systematic transfer and generalization of the strategies built the first phase of instruction across various tasks and content areas. The major mode of instruction moves to a more dynamic interactive and reflective one in which the teacher relies heavily on socratic dialogues to stimulate students to reflect and reconsider their views as well as

encouraging them to develop explicit understanding of tasks, strategies and their own motives, feelings and beliefs regarding these. The teacher is encouraged to utilize a number of other methods in conjunction with this dialogue including paired and group problem solving, thinking aloud, cooperative group, brainstorming on the pros and cons of various cognitive and metacognitive strategies for different tasks, situations and purposes. The students are led through teacher and group dialogue to become more aware of their own task apporach and strategy use as well as others and use this to critically analyze and then extend or modify their own personal strategies or the strategies presented to them.

By the time students are functioning in the third phase (student self-generation of strategies) of instruction they have developed a knowledge base regarding various cognitive and metacognitive strategies along with knowledge of their procedures for application including an awareness of where, when and why they should be used. This then serves as the knowledge base for student self-generated strategies. During this phase of instruction content is presented to the students with minimal amounts of teacher guidance as to how to complete the task. The teacher utilizing the socratic dialogue centres discussion around an analyisis of how the task was completed or is being approached by different students, analyzing of task requirements, alternative approaches and ways of determining the relative effectiveness of possible strategies. Here again paired and group problem solving thinking aloud is recommended.

There are a variety of cognitive and metacognitive strategies integrated into the approach including strategies which are effective for retaining information, comprehending information, communicating information (written and spoken), controlling affect and motivation, general and specific problem solving and numerous others (see Peat, Mulcahy, & Darko-Yeboah, 1989, for a listing of strategies taught). Because of the variety of the strategies taught and the interactive nature of our instructional methods, it is our belief that virtually all gifted students can benefit from increased awareness and practice of strategy use through the SPELT.

Inservice Training Procedures

The successful implementation of SPELT depends largely on the teacher. Therefore, inservice training is an integral part of the approach. The inservice training of teachers is divided into two parts.

During Part One training, teachers are introduced to the program's theoretical framework in cognitive psychology, to the three phase instructional model, as well as the practical applications of the model. Throughout Part One training teachers are continually exposed to cognitive theory of learning. Teachers are instructed to focus on the development of positive self competence and attributional belief systems of the students in conjunction with instruction in cognitive and metacognitive strategies.

Part Two Training has as its major emphasis the systematic transfer or students' strategic repertoire established earlier to other situations, settings, and applications (i.e., generalization). As the applications of the various strategies change, teachers are instructed to discuss with their students these strategy adaptations, modifications and/or extensions, emphasizing how these changes effect their use.

Students thus see that once a strategy is learned it is not carved in stone, but can be modified. This personalizes the strategies and acts as a stepping stone in the students ability to self-generate effective learning and thinking strategies -- the goal of the final phase of instruction.

During Part Two training, teachers are instructed in the principles and use of Socratic Dialogue which involves an interactive relationship between teacher and students with the students being led through questioning to discover for themselves. Socratic Dialogue is operationalized based upon the work of Collins (1977), specifying guidelines such as; a) starting with what is known, b) asking for multiple reasons, c) forming general rules form specific cases, d) picking counter examples when insufficient reason is given, e) using extreme case examples, f) probing for the difference between cases, and g) using prediction questions. Key teacher behaviors which facilitate Socratic Dialogue are also recommended (e.g., 5-10 second wait-time). It is important to note that Socratic Dialogue is the chosen methodology for discussion centering around the strategy use of students, but it becomes readily apparent

to teachers how this type of dialogue can enhance the thinking skills of students during any classroom discussion, regardless of content.

As the teachers recognize some of the specific strategies or methodologies presented, they begin to see that some aspects of their past classroom teaching has been emphasizing the teaching of learning/thinking skills, but that instruction in this area has usually been unconscious and/or incidental, lacking a precise goal or direction. This recognition aids in their conceptualizing 'cognitive education,' in spite of an often anti-theory bias, as non-threatening and achievable in their classrooms. Also, during the workshop, the teachers themselves actively practise the strategies and engage in paired problem solving, cooperative learning and Socratic dialogues by being placed in the role of students as the presenter's instructional approach moves along the SPELT continuum.

This model allows the teachers to experience first-hand the **process** that parallels that which their students will undergo as the approach is implemented in their classrooms. The process allowed the teachers to freely express their doubts and concerns throughout the inservice, a factor shown to be important in facilitation receptivity to change. Placing the teachers in the student position also has the effect of concretely demonstrating to them in the dual role of learner and teacher. It also serves to emphasize their reponsibility as role models of systematic and strategic problem solvers.

It is interesting to note that the functions of the teacher emphasized in our inservice training parallel some of the characteristics found in the successful teacher of the gifted. Story (1985, cited in Baldwin, 1993), for example, reported that the successful teacher of the gifted was most frequently described as "a facilitator of learning." In addition, based on her ethnographic observations and interviews, Story listed several other characteristics are also the qualities we attempt to foster in the teachers during the inservice training.

SPELT : A Longitudinal Study

The SPELT cognitive education approach has been extensively evaluated in a three-year longitudinal study. Approximately 300 gifted students, as one of the three categories of subjects, were included in the study and their cognitive and metacognitive

performance examnined. The research design, program implementation and assessment instruments will be briefly described in the following sections (for full details, see Mulcahy et al., 1993).

Research Design

The study involved two years of experimental instruction followed by one-year maintenance period where all instruction was withdrawn. We utilized a repeated measures factorial design involving three types of instructional programs (Instrumental Enrichment, SPELT and Control); two initial grade-levels (grade 4 and grade 7), and four repeated measures: pre-test in the Fall of the initial year, two post-tests in succeeding May/June periods, corresponding to the end of grades 4,5,7, and 8, and a maintenance post-test at the end of grades 6 and 9.

With respect to subject selection, several selection criteria served to identify the gifted sample. First, gifted students were those obtained scores of 115 or higher (i.e., one or more standard deviations above the mean) on both verbal and nonverbal cognitive ability as measured by the Canadian Cognitive Abilities Test. Second, they also performed above grade level on reading and math subtests of the Canadian Achievement Test were selected. Furthermore, they were rated by teachers to be above the mean (of the total study population) on learning characteristics, creativity, and motivation on the Renzulli and Hartman's Scales for the Rating of Behavioral Characteristics of Superior Students. In short, gifted students in this study were identified as those having high cognitive ability, high academic achievement, and high creativity and motivation.

Program Implementation

Teachers volunteered for any one of the three instructional conditions. The research team then randomly assigned them to instructional condition with the constraint that a given school could only be involved with one instructional condition. Teachers assigned to the control condition (traditional instruction) were told to teach as usual, whereas the teachers assigned to the two cognitive education procedures received in-service training from project staff prior to giving strategy instruction. Students involved in the two cognitive education programs received a minimum of one hundred and twenty minutes of strategy instruction per week over two school-

years. Strategy instruction was followed by one year of maintenance, during which all strategy instruction was withheld.

Assessment Instruments

Four categories of instruments were utilized in this study:

a. Cognitive ability was assissed by the Canadian Cognitive Abilities Test (CCAT), which includes verbal, quantitiative, and nonverbal reasoning abilities.
b. Academic achievement was assessed by the Canadian Achievement Test (CAT) which consists of two separate batteries measuring skills in reading (vocabulary, comprehension) and mathematics (computation, concept /application).
c. Affective perceptions involved measures of perceived competence in four areas (cognitive, social, physical, and general); attitudes toward the self in social, academic, family and personal aeas of experience; and students' beliefs regarding responsibility for outcome in academic-achievement situations.
d. Cognitive and metacognitive strategies were assessed in the areas of reading awareness, reading strategies, comprehension monitoring, perceived problem-solving ability, and problem-solving strategies.

Most of the above measures were implemented in both the pre-test and post-test phases, with the exception that measures of cognitive strategies were not available at the pre-test point , and were administered at the post-test points only. Teachers, administrators and parent perceptions of program implementation and effects were also evaluated each year.

SPELT: Program Effects for the Gifted

The detailed results of this study have been reported elsewhere (Mulcahy, 1991; Mulcahy et al., 1993). Because of the large amount of data, only the results with respect to the SPELT approach will be reported here for the gifted students.

Grade 4 Gifted

Grade 4 gifted students in the SPELT program did not differ from their control counterparts on standardized measures of academic achievement as ceiling effects for all the gifted groups was evident. However, there were experimental program effects evident with respect to other aspects of reading

performance. For example, using the close task as a measure of reading comprehension performance, it was found that gifted students in the SPELT performed at higher levels than their counter parts in the control, particularly by the end of maintenance (see Figure 1).

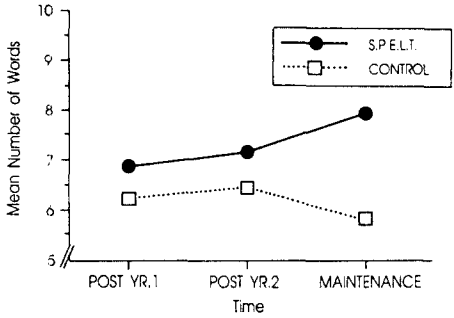

Figure 1. Close performance: Grade 4 Gifted

Moreover, there was indication of a positive impact on grade 4 gifted students' cognitive and metacognitive strategies development. First, data from the error-detection task indicated that the SPELT program significantly affect the comprehension monitoring skills of grade 4 students. Specifically, a significant group main effect was obtained for the passage given at the frustration level, indication gifted students in the SPELT condition monitored their comprehension more frequently and effectively when they encountered comprehension obstacles. In addition, a trend problem-solving strategies, it was noted that gifted students in the SPELT program demonstrated greater use of determining alternative ways of solving word problems (see Figure 2).

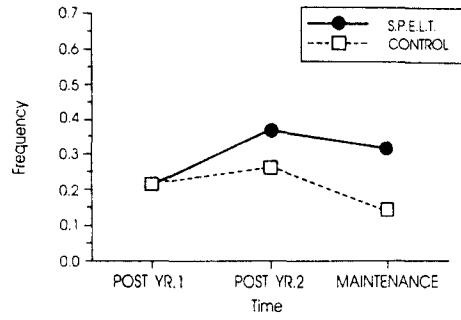

Figure 2. Math Strategy (Determining Alternative Ways): Grade 4 Gifted

Grade 7 Gifted

With respect to standardized measures of academic achievement, the math concepts and application performance of grade 7 gifted students appeared to be affected to some extent by the SPELT instruction. The gains, after two years of instruction for the SPELT group and the control group were grade equivalents of 2.0 and 1.1

respectively. In the area of reading achievement, there were no significant effects on performance of standardized measures. This is to be expected since the initial level of reading performance on standardized measures by gifted students was high at the outset. However, in terms of reading cloze performance, the SPELT group outperformed the control group at the end of the maintenance year.

Similar to the results of grade 4 gifted students, evidence of program effects on cognitive and metacognitive strategy development was observed for grade 7 gifted students. First, it was observed that the SPELT program significantly affected gifted students' metacognitive awareness in reading. After only one year of instruction the metacognitive reading awareness of these students appeared to be enhanced and this difference was maintained over time (see Figure 3).

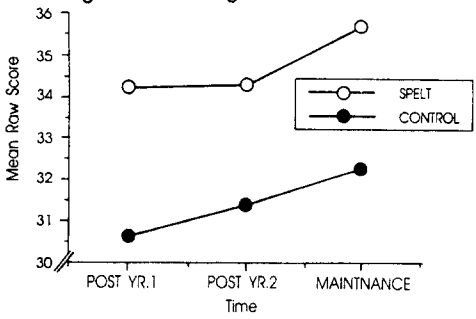

Figure 3. Metacognitive Reading Awareness: Grade 7 Gifted

For comprehension monitoring performance as measured by the error -detection task with passages given at the frustration level, the SPELT group outperformed their control counterparts on all three post-testing points (see Figure 4.)

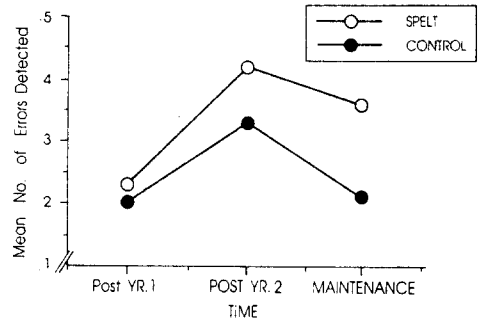

Figure 4. Comprehension Monitoring: Grade 7 Gifted

Teacher and Parent Perceptions

While no specific data were obtained from parents of gifted students, the overall evaluation from parents of the students involved in the SPELT program is very encouraging. They recognized significant positive changes in their children in a number of areas. For example, the parents indicated that more

attention was given by their children to homework along with increased time dealing with tasks. They also reported increasing willingness to tackle more difficult tasks along with an increase in questioning and originality of thinking, As well, teachers observed students in the SPELT program to be more "accepting", "enthusiastic", "confident", and noting that students made "more of an effort on schoolwork," The comment of "taking more responsibility for learning"was often voiced by the SPELT reachers.

Summary and Conclusions

The overall results for gifted students participating in the SPELT program appear to be promising. While ceiling effects were observed for most of the standardized measures of academic achievement, more processoriented measures such as the cloze task indicated improved reading performance in gifted students in both grade levels. More importantly, positive changes were evident in student performance with respect to metacognitive awareness and strategy use, particularly in the area of reading comprehension and to some extent in the area of math problem-solving.

The results observed with respect to student change, coupled with the perceptions of parents and teachers, suggested that the teaching of learning/ thinking skills should be made an integral part of the education for the gifted. Appropriate intervention can further enhance gifted students' cognitive and metacognitive development. While the question of how early thinking skills training should start for gifted children could not be answered here, the results clearly indicated that gifted students in elementary grades can benefit from strategy instruction. It seems apparent that gifted students as young as nine or ten years old have the intellectual ability to perceive the usefulness of the strategies and then to use and extend them immediately. Further research is needed to demonstrate the utility of thinking skills training for gifted students at a much younger age.

In conclusion, the SPELT approach appears to have particular relevance to the education of the gifted as the results showed that gifted students, both at elementary and junior high levels, benefit from this instructional approach even in regular classroom settings where special arrangements such as special courses or separate sites are not

required. In this sense, the SPELT approach offers the possibility to look further into gifted education within the mainstream of education.

References

Adey, P., Shayer, M. (1994). *Really raising standards: cognitive intervention and academic achievement.* New York: Routledge.

Baldwin, A. Y. (1993). Teachers of the gifted. In K. A. Heller, F. J. Monks, & A. H. Passow (Eds.). *International handbook of research and development of giftedness and talent (pp. 621-630).* Oxford, UK: Pergamon.

Borkowaki, J. G., Carr, M., Rellinger, E., & Pressley, M. (1990). Self-regulated cognition: Interdependence of metacognition, attributions, and selfesteem, In B. F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction* (pp. 53-92). Hillsdale, NJ: Lawrence Erlbaum.

Borkowaki, J. G., & Peak, V. A. (1986). Causes and consequences of metamemory in gifted children. In R. J. Sternberg & J. E. Dadison (Eds.), *Concetions of giftedness* (pp. 182-200). New York: Cambridge University Press

Cheng, P. (1993). Metacognition and giftedness : The state of the relationship. *Gifted Child Quarterly, 37,* 105-112.

Collins, A. (1977). Processes in acquiring knowledge. In R. C. Anderson, R. G. Spiro, & W. E. Montague (Eds.), *Schooling and the acquisition of knowledge* (pp. 339-363). Hillsdale, NJ: Lawrence Erlbaum.

Harris, K. R., & Pressley, M. (1991). The nature of cognitive strategy instruction: Interactive strategy construction. *Exceptional children,* (pp. 393-403).

Kanvesky, L. (1992). Gifted children and the learning process: Insights on both from the research. In F. J. Monks & W. Peters (Eds.), *Talent for the future* (pp.155-161). Maastricht, The Netherlands: Van Gorcum.

Jackson, N. E., & Butterfield, E. C. (1986). A conception of giftedness designed to promote research. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 51-181). New York: Cambidge University Press.

Moss, E. (1990). Social interaction and metacognitive development in gifted preschoolers. *Gifted Child Quarterly, 34,* 16-20.

Mulcahy, R. (1991). Developing autonomous learners. Alberta *Journal*

of Educational Research, 37, 385-397.

Mulcahy, R., Andrews, J., & Peat, D. (1989). Cognitive education: A longitudinal evaluation. In C. K. Leong & B. S. Randhawa (Eds.). *Literacy and cognition: Theory, research and instructional implications.* New York: Plenum.

Mulcahy, R., Marfo, K., & Peat, D. (1984). SPELT: A strategies program for effective learning and thinking. Research edition (available from the cognitive education project, Department of Educational Psychology, University of Alberta, Edmonton, Alberta, Canada).

Mulcahy, R., Peat, D., Andrews, J., Clifford, L., Darko-Yeboah, J., Norman, C., Cheng, P., Marfo, K., & Cho, S. (1993). *Cognitive Education Project.* Alberta Education, Edmonton, Alberta.

Paris, S. G., & Byrnes, J. P. (1989). The constructivist approach to self-regulation and learning in the classroom. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research and practice.* Springer-Verlag, New York.

Paris, S. G., & Winograd, P. (1990). How metacognition can promote academic learning and instruction. In B. F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction* (pp. 15-52). Hillsdale, NJ: Lawrence Erlbaum.

Renzulli, J. S. (1986). The three-ring ' conception of giftedness: A development model for creative productivity. In R. J. (1992). Self-regulated learning in gifted students. *Roeper Review, 15,* 98-101.

Risemberg, R., & Zimmerman, B. J. (1992). Self-regulated learning in gifted students. *Roeper Review, 15,* 98-101.

Rogers, K. (1986). Do the gifted think and learn differently? A review of recent research and its implications for instruction. *Journal for the Education of the Gifted, 10.* 17-39.

Scruggs, T. E., Mastropieri, M. A., Monson, J. & Jorgensen, C. (1985). Maximizing what gifted students can learn: Recent findings of learning strategy research. *Gifted Child Quarterly, 29,* 181-185.

Scruggs,T. E., Mastropiere, M. A., Jorgensen, C., & Monson, J. (1986). Effective mnemonic strategies for gifted learners. *Journal for the Education of the Gifted, 2,* 105-121.

Scruggs, T. E., & Mastropieri, M. A. (1988). Acquisition and trasfer of learning strategies by gifted and

nongifted students. *Journal of Special Education, 22.* 153-166.

Shore, B. M., & Kanevsky, L. S. (1993). Thinking processes: Being and becoming gifted. In K. A. Heller, F. J. Monks, & A.H. Passow (Eds.), *International hahdbook of research and development of giftedness and talent* (pp. 133-148). Oxford, UK: Pergamon.

Stemberg, R. J., & Davidson, J. E. (Eds.) (1986). *Conceptions of giftedness.* New York: Cambridge University Presss.