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Teachers' Role in the Development of Children's Metamemory and Strategy Knowledge: A Cross-Cultural Comparison of American and Singaporean Elementary School Teachers

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TEACHERS' ROLE IN THE DEVELOPMENT OF CHILDREN'S METAMEMORY AND STRATEGY KNOWLEDGE: A CROSS-CULTURAL COMPARISON OF AMERICAN AND SINGAPOREAN ELEMENTARY SCHOOL TEACHERS

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

Considerable research has examined the connection between metamemory and learning performance (e.g., Black & Rollins, 1982; Cavanaugh & Borkowski, 1979; Kurtz, Borkowski, & Deshmukh, 1986; Pressley, 1982). Metamemory, a subset of metacognition, is self-knowledge about memory processes (Brown, 1978), or more generally, an individual's cognition or knowledge about any process pertaining to memory (Flavell, 1985).

According to Kurtz (1990), metamemory has a twofold influence on the efficient use of memory strategies. First, in order to successfully implement memory strategies, individuals must possess prior knowledge about specific strategies about how, when, and why they are appropriate for particular tasks. Second, metamemory affects the use of strategies through its regulatory function. That is, it allows the individual to monitor the effectiveness of a strategy, and modify its use when faced with new task demands. The purpose of this research is to examine the role of teachers in affecting children's acquisition of knowledge on specific strategies, and to establish the role culture plays, if any, in influencing memory strategy preferences of teachers.

In an attempt to address these issues, teachers' metamemory and strategy knowledge as determining factors of children's metacognitive abilities will be explored in this research. The role formal education plays in affecting metacognitive growth will

also be addressed in conjunction with a brief examination of the evidence that strategies and metamemory knowledge can indeed benefit performance. The relationship between culture and memory strategy preference is the central focus of this inquiry and will be discussed in more detail. It is believed that the value placed on particular cognitive skills may influence the culture's preferred strategy, by the extent to which the strategies facilitate the development of the valued abilities.

Social Interaction and its Influence on the Development of Higher Cognitive Functions

One important question frequently asked when researchers examine cognitive development is what are the crucial elements involved in the development of higher cognitive structures? There has been considerable research that has examined the profoundly important role of social interaction as an environmental determinant on the development of children's higher cognitive abilities (e.g., Day, French, & Hall, 1985; Kurtz, 1990; Stevenson, 1988). Young children are active learners, constantly attempting to make sense of the world, and as they learn to communicate they engage in active problem-solving, and form hypotheses on the information they extract from their experiences. They form rules which are then tested, revised, and reconstructed until they come closer to the conventional forms of adult symbol use (McLane & McNamee, 1990). The development of these skills, therefore, is an intricately woven social process that is based on children's relationships with parents, siblings, caretakers, and teachers. This network of individuals serve as models, and provide instruction, material, and support that promote the optimum development of skills necessary to function in the environment.

As a result, children accumulate the knowledge and tools necessary to develop cognitive systems that they then learn to generalize to new problems and novel situations. Indeed, Vygotsky (1978) proposed that all higher psychological functions develop in social interaction. Cognitive skills emerge and are refined as children actively participate in supportive contexts that are structured by others (Day et al., 1985). Adults and more capable peers assume the role of supplying the child with culturally appropriate means of understanding and coping with the natural environment, as well as regulating ongoing problem-solving efforts which eventually become adopted as part of the child's individual psychological functioning. Cognitive development, in other words, involves a progression from interpersonal, external supports to intrapersonal, internal mechanisms (Kurtz, 1990). The development of cognitive functions such as those involved in remembering, therefore, is presumably first controlled by explicit prompts, modeling, and other external social factors (Day et al., 1985; Kurtz, 1990; Tharp & Gallimore, 1988). This structure is gradually internalized until remembering becomes the child's goal, and through a process aided by maturation, the child then develops the necessary cognitive tools to effectively accomplish this objective.

Internalization, hence, is the process by which the social becomes the psychological (Tharp & Gallimore, 1988). What is spoken to a child in the form of instructions is later repeated by the child to the self, and is later transformed into the silent speech of the child's thought. Self-regulation would eventually disappear, and the child would learn to execute the task in a smooth and integrated fashion. Despite

being highly influenced by social processes, the attainment of these cognitive structures may or may not be the result of conscious effort. Although some structures can be easily verbalized, this is not necessarily so for all cognitive structures. Certain structures may be operating at an automatic, subconscious level, a level of automation Vygotsky (1978) referred to as "fossilized" behavior. Due to this automatic, subconscious functioning, fossilized behavior poses a problem for researchers trying to better understand the ways in which children acquire certain cognitive skills, for example, metamemory knowledge and the use of memory strategies. Sufficient insight on how children acquire the knowledge and skills necessary for remembering may elude those who are focused on mainly examining children's internal thought processes and reasoning behind strategy preference.

One of the reasons behind the problem is that when fossilized behavior occurs, neither self-directed speech nor the speech of others is helpful, and would indeed even be disrupted and distorted by assistance (Tharp & Gallimore, 1988). Therefore, requests for subjects to verbalize the process that pertains to a behavior already fossilized may not provide useful or accurate information. For example, once a child has mastered the concept of addition and subtraction, requesting for an explanation of the mechanics behind the steps taken to complete the task would tend to disrupt performance by reintroducing self-directed speech into the behavior. According to Tharp and Gallimore (1988), this self-conscious attempt itself is detrimental to the smooth integration and execution of task components. Hence, although the cognitive processes children acquire from teachers and parents may be unconscious, they still are

important influences on children's strategy knowledge and metacognitive development (Kurtz, Schneider, Carr, Borkowski, & Rellinger, 1990).

Another important component of Vygotsky's theory is the role that the adult or more capable peer plays in assisting in the learning process. By assuming responsibility for some parts of the task, the capable peer or adult allows the learner to focus on the pertinent subcomponents. In doing so the expert assumes metacognitive control of the situation, thereby allowing the child to complete her goal successfully. This metacognitive control assumed by the expert is essential in order for the learner to gain awareness and control over these mental processes--because only through use and practice, and the resulting experience of successfully improving performance, can the cognitive structure be internalized.

Prior to children's entry into the school system, their exposure to cognitive processes tends to be on an informal basis. However, the skills sufficient for the socialization of the young child by parents or siblings, for instance, is not adequate enough to provide a foundation that will promote the development of more sophisticated cognitive functioning (Tharp & Gallimore, 1988). Teachers, on the other hand, have a more elaborate set of skills to assist and direct students, and they tend to be more conscious of the application of strategies and metacognitive knowledge. Children are active participants, inventing cognitive structures during learning, and it is often necessary for the teacher to assist by first providing these structures through modelling or direct instruction, both to accelerate learning as well as to correct any idiosyncratic or unreliable structures that may emerge.

Effects of Strategy Training on Children's Task Performance

It is generally accepted that cognitive development is a collaborative process involving the child and the environment. Recent studies have taken this a step further by looking at the influence of specific instruction by experts on children's performance. This research has examined the effects of strategy training on children's performance on memory tasks (e.g., Black & Rollins, 1982; Cavanaugh & Borkowski, 1979; Ghatala, Levin, Pressley, & Lodico, 1985; Harris, Graham, & Freeman, 1988; Lodico, Ghatala, Levin, Pressley, & Bell, 1983; O'Sullivan & Pressley, 1984; Rao & Moley, 1989), and demonstrated that when children are provided complete strategy instructions, and given information about a strategy's utility, subsequent usage increases (Pressley, Borkowski, & O'Sullivan, 1985). For example, Ghatala and her colleagues (1985) found that second-grade children who were trained to monitor the utility of strategies experienced a dramatic change in performance relative to their baseline accomplishment while using the trained strategy. These children were able to connect their change in performance to their use of the instructed strategy. In addition, there was also long-term maintenance of the effective strategy, and more ready abandonment of the ineffective strategy.

Formal Education and Children's Strategy Acquisition

Such research provides evidence that strategies can be trained, and that they do have a positive effect on children's memory performance. The research cited also offers support for Vygotsky's position that cognitive processes are transmitted through social interaction. The studies, however, represent a conscious and rather exceptional

effort on the part of the social forces to transmit essential cognitive processes. It is unclear if it is only through such conscious effort that these cognitive processes can be transmitted, or if there are other subtle factors that mediate cognitive development in this area.

It has been demonstrated through cross-cultural studies that children who participate in formal education develop adult-like memory strategies, and that these children differ markedly in the use of planful memory strategies when compared to their same-aged peers who have not attended school (Naus & Ornstein, 1983). Cole and Scribner (1977) have asserted that experience in formal educational settings may be a key prerequisite for the development of mnemonic strategies. They believe that schools represent "the major cultural institution in technological societies where remembering as a distinct activity, occurring apart from the application of anything remembered, is engaged in repeatedly with a great variety of stimulus materials" (p. 269).

Despite such findings and hypotheses, it has still not been determined what school activities in particular precipitate metacognitive growth. According to Naus and Ornstein (1983), teachers generally do not provide much explicit training in memory skills, therefore, it seems likely that certain in-class tasks that require the use of mental activities pertinent to remembering contribute to the development of adult memory skills. Naus and Ornstein (1983) have also hypothesized that teachers induce appropriate strategy usage through their requests for memorization. To date, however, only a handful of studies have focused on the specifics involving the teacher's role in assisting children acquire memory strategies and metamemory concepts through daily

classroom activities.

In one recent study Moely, Hart, Santulli, Leal, Johnson, Rao, and Burney (1986) found that teachers instruct children in the use of memory strategies, and provide feedback about the effectiveness of such strategies on memory performance. They found that children whose teachers provided cognitive suggestions benefitted from the memory instruction and were better able to verbalize aspects of the training procedure and task performance (thus suggesting enhanced metacognitive abilities) than children whose teachers did not emphasize cognitive processes. However, such teaching activities do not occur with high frequency, and as the authors noted, it is distressing that strategy rationales are infrequently employed given the extensive research demonstrating the effectiveness of strategy training in promoting improved memory task performance.

Cultural Influences on Cognitive Development

In addition to examining the role teachers play in the development of children's memory skills, research has also shown that teachers and parents from different cultures emphasize particular cognitive abilities over others. The socially-determined value placed on these cognitive skills may in turn affect the significance placed on particular memory strategies, and the extent to which these strategies promote the desired ability. Stevenson (1988), for instance, found that American parents gave less attention to mathematics compared to the attention given by parents of Asian cultures, such as in Japan and Taiwan. He believed that if parents do not feel strongly about the importance of a particular ability, it is unlikely that the child will be given the

psychological support, assistance and experience required for the rapid development of that faculty. Teachers within the same culture, as a result, may be less likely to devote the time and energy necessary to promote that skill.

According to Stevenson (1988), the emphasis and value a culture places on certain cognitive skills determines to a large extent the repertoire of skills children in that society display. It is, therefore, not surprising that the regard children have for such abilities reflect the priorities of the culture. These socially-determined appraisals dictate the sense of achievement children derive from excelling in the different cognitive areas. Consequently, certain memory techniques may be preferred over others depending on the utility and efficiency the strategy has for developing or enhancing the culturally-emphasized skill.

In addition, individual and group variations in children's performance on cognitive tasks may be directly related to differences in teaching goals and styles, depending on culture. Support for this hypothesis can be found from one of Kurtz, Borkowski, and Deshmukh's secondary findings in their 1986 study of Maharashtrian children. Kurtz and her associates discovered that these Indian children differed in their use of memory strategies from their Western counterparts. Specifically, Maharashtrian children relied more on repetition and rote rehearsal than any other strategy. This difference was attributed to probable differences in instructional goals--Maharashtrian teachers placed greater emphasis on rote versus other strategy-oriented methods of learning. Unfortunately, however, Kurtz and her colleagues did not explore the possible reasons for the Maharashtrian teachers' preference for this strategy.

Further support for the assertion that differences in cognitive performance may be directly influenced by cultural determinants can be found in a cross-cultural study designed to examine teachers' reported instruction of strategy and metacognitive knowledge in the classroom. Kurtz and her colleagues (1990) hypothesized that attributional and strategic differences found between American and German children are related to differences in teachers' instructional practices and belief systems. When teachers were presented with a questionnaire inquiring about their instruction of strategy and metacognitive skills, and their attribution for students' academic success and failure (see Kurtz et al., 1990, for detailed description), they found that German teachers employed more instruction of task-specific strategies, e.g., relating new information to old information, breaking tasks down into steps, and using external concrete aids. American teachers, on the other hand, reported more metacognitive guidance to impulsive children than German teachers, and resorted more to monitoring students' performance, and checking as strategies of choice. Furthermore, American teachers reported stronger effort attributions to account for the children's success or failure than did German teachers. This finding corresponded to differences found in previous research among children and parents in the two countries. Kurtz and her colleagues attributed these differences to culturally-related factors such as language, educational systems and economic conditions.

CHAPTER II

RATIONALE AND PREDICTIONS

One of the goals of this study was to examine the widely accepted belief that elaborative strategies are in most instances superior to rehearsal and rote memorization techniques. One hypothesis of this research was that an individual's proficiency with a memory strategy, and effectiveness in the application of that strategy, is largely determined by the values and goals held by that individual. The personal values and goals are in turn affected by the objectives promoted by the culture.

The Effects of Culture

One approach to examining the basic differences in memory strategy preference between cultures is to look at the role of teachers in promoting the development of metamemory skills in the formal educational environment. In this study, teachers from America and Singapore were asked to participate. Singapore was chosen for this study, primarily due to the similar educational system, goals, and values it shares with the more widely-researched cultures of China, Hong Kong, and Taiwan. Although culturally diverse, the ethnic majority in Singapore is made up primarily of Chinese, and Singaporeans on the whole share the same ethics and value systems of the predominantly Chinese nations previously mentioned. Singapore has one of the highest literacy rates among the Asian countries--all children are required by law to undergo

formal education up until the sixth grade, after which, parents assume the main influence on their children's continued education. Although the law mandates education up until the sixth grade, only a small minority of children fail to continue with their secondary education. The majority of parents urge their children on to college and pre-universities (the equivalent of 11th and 12th grades in the U.S.), however, only a small minority of the population will proceed on to tertiary education at the only two national universities in Singapore.

Although formal education has been identified as the source of more elaborate and sophisticated cognitive abilities, it has not been established what component in particular promotes this development. This study will attempt to examine if there are indeed differences in educators' proficiency and understanding of metamemory knowledge and strategy preference which may be attributed to the cognitive skills valued by the culture. American children, for example, perceive themselves as intelligent based on their individual evaluation of their reading ability. Chinese children, on the other hand, are more likely to consider themselves bright if they perceive themselves as being skilled in mathematics (Stevenson, 1988). In other words, a society that places greater value on cognitive skills involving, for example, mathematics and science, may have a preference for memory strategies that would promote math and science abilities. Based on Stevenson's (1988) study, it was hypothesized that the American teachers in this study would suggest more elaboration-type strategies as a function of the greater emphasis placed on language development, and that the Singaporean teachers would tend to rely more on rehearsal as a strategy of

preference due to the emphasis placed on math and science.

Teacher Experience and Number of Suggested Strategies

Another area of interest involves teachers' knowledge of metamemory and their use of appropriate memory strategies in relationship to the number of years they have been teaching. Kurtz et al. (1990) in their study, for example, found that teachers with fewer years of experience reported more task-specific strategy instruction than teachers with more years of teaching experience. This may be because teachers over time tend to develop theories on the factors they believe influence academic achievement. As these theories are tested and refined, teachers develop a set pattern of teaching which they then apply across their individual educational settings. It is, therefore, hypothesized that teachers with less field experience will provide a wider range of suggestions in comparison to their more experienced colleagues, and may have less difficulty recommending a larger variety of strategies for a given task. Furthermore, the variety of subjects a teacher teaches may influence the number as well as the appropriateness of the suggested strategies.

Performance and Strategy Preference as a Function of Subjects Taught

It was further hypothesized that the subjects teachers were assigned to teach may influence their preference for particular strategies, and that these preferences would be evident in their approach towards the given tasks. For example, subjects requiring memorization of factual information would elicit predominantly rehearsal strategies, and that language subjects, for example, English, reading, and language arts would elicit, particularly among American teachers, elaboration-type strategies. As a result, if a

teacher taught predominantly math and science subjects, then it was hypothesized that the preferred strategy would be rehearsal, or if the most frequently taught subject was English, then elaboration would be the strategy of choice. It was also predicted that the more subjects a teacher taught, the wider would be the range, as well as accuracy of strategies suggested.

In order to assess the American and Singaporean teachers' role in developing children's metamemory knowledge and strategy use, a detailed questionnaire was sent to willing participants in the two countries. The questionnaire, which consisted of both closed and open-ended questions, was sent to teachers in public and parochial schools in the Chicago area and the neighboring suburbs, and government and government-aided schools in Singapore. The closed-ended questions were included to reduce respondent burden. Although open-ended questions could potentially be more difficult to interpret, it is believed that valuable information would be obtained about the different methods that teachers have devised as a result of their years of experience. Furthermore, the open-ended questions may allow for any idiosyncratic responses that may be inherent in a particular culture to emerge for further scrutiny.

CHAPTER III

METHOD

Subjects

Teachers from the United States and Singapore were asked to participate in this study. Names of teachers were obtained through their respective schools, after which they were recruited individually by mail. The American schools were selected through simple random sampling of all public and parochial schools in Chicago and the neighboring suburbs. Similarly, schools in Singapore were randomly sampled from a list of all government and "government-aided" schools (government-aided schools are by and large autonomous, and are comparable to parochial schools in the U.S.). All teachers from the first through sixth grades (of schools randomly selected) were then contacted through a letter and informed of the study. Teachers from schools with a large teacher population were again randomly selected from the list provided by the principals. Principals were also given a brief description of the study, and requested to encourage their teachers' participation. Specific demographic information for the American and Singaporean teachers is presented in the results section.

Materials and Procedure

A questionnaire consisting of five sections was given to the teachers. Section A consisted of demographic information, such as gender, the estimated socio-economic

status of the students, and their number of years of teaching experience. Section B requested information on the various subjects these teachers were responsible for, including the different classroom activities they were predominantly engaged in. Sections C and D made up the core of the questionnaire, and were designed to evaluate teachers' metamemory and strategy knowledge through both closed- and open-ended questions. Section E, which was essentially a metamemory assessment, was included to provide information on teachers' attitudes with regards to strategy instruction.

More specifically, the questions in sections C and D were designed to assess teachers' knowledge of specific strategies, see Appendix A. The appropriateness of a strategy for a particular task presented to the teachers was based on the work of Black and Rollins (1982), Pressley (1982), Pressley, Borkowski, and O'Sullivan (1984), Pressley, Borkowski, and O'Sullivan (1985), Pressley and Levin (1977), Pressley and Levin (1978), Pressley, Levin, and Ghatala (1984), and Sodian, Schnieder, and Perlmutter (1986). For example, in the following question posed to teachers, "You are teaching a class and one of the assignments is to have your students remember the following list of (unrelated) words...," the best solution in this instance, based on Pressley et al.'s (1985) work, would be to use a combination of elaboration and group rehearsal strategies. In contrast, the task requiring students to remember a shopping list (question C3) would best be accomplished using a clustering strategy. According to Black and Rollins (1982), when children were trained to sort items into taxonomic categories, memory was enhanced, especially when detailed verbal instructions concerning the advantages of such strategies were included.

Other questions inquired about teachers' expectations of age-appropriate strategies for children. For example, question C8 posed this problem, "Rehearsal is another strategy frequently used to aid memory....At what age do children first begin to show that they can use this strategy?". Further questions (section E) were designed to tap teachers' personal metamemory knowledge and their attitudes about strategy use and activities they are involved in to help their students remember.

Scoring and Coding

Scoring on the accuracy of teachers' expectations was based on research by Black and Rollins (1982), Kail (1990), Pressley (1982), Pressley, Borkowski, and O'Sullivan (1984), Pressley, Borkowski, and O'Sullivan (1985), and Pressley and Mac Fadyen's (1983). Specifically, scoring for the portions of the questionnaire (sections C and D) assessing strategy knowledge was based on the hierarchy of memory strategies established by previous research. This research has suggested that in most instances elaboration type strategies result in superior performance compared to rote rehearsal, especially for vocabulary learning and paired-associate tasks.

For question C1, (What do you do to help students remember? What strategies or special memory techniques do you teach your children...) the goal was to establish the variety of strategies teachers were familiar with. Their reported use of the different strategies, and their performance in selecting the appropriate strategies for the latter tasks would provide an indication of accuracy of knowledge.

Based on Pressley et al.'s work (1985), item C2, (You are teaching a class and one of the assignments is to have your students remember the following list...) was

scored as follows: Four points were awarded for selecting image-based elaboration, and 3 points for multiple-item rehearsal. Image-based elaboration or interactive imagery was judged to be more effective for vocabulary learning than rehearsal (Pressley et al., 1985). Two points were given for verbal elaboration, and 1 additional point for having selected image-based elaboration (the primary method) and rehearsal or verbal elaboration. Although verbal elaboration was proven effective for even young children in paired-associated tasks (Pressley, 1982), the use of verbal elaboration for this particular item would not be as appropriate, given the nature of the word list to be remembered. For such a task, multiple-item rehearsal would have been the next most effective strategy (based on Pressley et al., 1984). Respondents were also awarded an extra point for suggesting an appropriate strategy not listed. One point was deducted for every inappropriate strategy selected to adjust the scores for random guessing.

Items C3, C4 and C5 were scored in a similar fashion as item C2. If clustering, reminder, or image-based elaboration was suggested respectively, 4 points were awarded. Three points were given for a response that suggested image-based elaboration as the appropriate strategy for both C3 and C4, and rehearsal for C5. Once again, additional points were awarded if two or more appropriate strategies were suggested and a point deducted for every inappropriate strategy chosen.

Section D comprised of three open-ended questions. Question D1 asked for a strategy to effectively remember 10 numbers for a short time period. Four points were awarded for an answer that indicated chunking the number series into smaller groups of three or four numbers, and three points were awarded for suggesting rehearsal.

Although image-based or verbal elaboration could be effective for long-term maintenance, the effort required to commit the numbers to long-term memory does not warrant its use in this particular instance, therefore, only two points were given if respondents referred to image-based or verbal elaboration. One bonus point was awarded if two or more appropriate strategies were suggested.

For questions D2 and D3, teachers were asked what action they would take if a student was not able to utilize a particular strategy. For D2, the appropriate strategy would be to simplify the task by resorting to a strategy the student is already familiar with, in this case rehearsal. An earlier study conducted by Sodian, Schneider, and Perlmutter (1986) demonstrated that children as young as four years of age can be taught to improve their recall performance by instructing them to use an organizational strategy. Therefore, if a child is not able to grasp the concept of organizing objects into taxonomic classes, then a more rudimentary strategy should be employed. According to Nelson and Hudson (1988), verbal rehearsal is a skill available to children by about age three, and this is evidenced by young children's ability to, for example, recite nursery rhymes.

For Question D3, teachers were asked to suggest an alternative strategy if their efforts in instructing the imagery technique failed. It has been found that imagery instructions become increasingly effective with increasing age during childhood (Pressley, 1982). Verbal elaboration, on the other hand, can be taught to young children. According to Levin, McCabe, and Bender (1975), even nursery school children's memory improves when they are taught to produce verbal elaborations.

Therefore, four points were awarded for a response that suggested verbal elaboration as an alternative strategy. Three points were given for suggesting rehearsal, and two points were awarded if teachers attempted to simplify the task by breaking the item down into component parts, or by making the task more concrete for the child. One bonus point was awarded if two or more strategies were suggested.

For Section E of the Questionnaire, teachers were asked to rate the importance of certain factors that previous research has found to have influence on memory performance. Questions E2, E3, and E5 were reversed-coded to adjust for possible response set. Therefore, if they circled 1 on the Likert-type scale, they would receive a score of nine and vice versa. For example, in Question E2, teachers were asked if they thought it was important for children to have knowledge of specific memory strategies. Pressley, Borkowski, and O'Sullivan (1984), considered specific strategy knowledge as crucial to efficient strategy functioning. They believe that one of the elements that differentiates proficient memorizers from inefficient ones is the knowledge of specific memory strategies, and when to use them. Hence, if a teacher indicated that it was very important for children to have knowledge of specific memory strategies, (s)he would then receive the maximum score or vice versa.

Question E3 assessed teachers' beliefs on the importance of informing children that the trained strategy improved memory performance. Flavell and Wellman (1977) established that children begin to use sophisticated memory strategies only when they understand that the technique employed enhanced their memory. Therefore, if teachers indicated that it was very important for students to be provided feedback--that the

trained strategy improved memory performance--they would be given a score of nine, or a score of one if they believed the opposite was true.

The last reversed-coded question, E5, inquired about the importance of giving students explicit instructions on the use and application of the different memory strategies. According to Black and Rollins (1982), children should be explicitly taught various memory strategies, and given detailed verbal instructions concerning the use and application of such strategies. Pressley, Borkowski, and O'Sullivan (1985) believed that it is important for children to know whether a strategy aided in the past in learning material similar to that being studied. Proficient memorizers then learn how to modify the strategy to fit the various types of materials. Question E5, therefore, was scored in a similar fashion as questions E2 and E3.

Questions E4 and E6 were essentially opposites of E5 and E1 respectively. Therefore, if teachers responded to question E4, for example, that it was not important for children to be allowed to discover memory strategies on their own, the teachers would then receive the maximum score of nine and vice versa. Question E6 was similarly scored as item E4.

CHAPTER IV

RESULTS

Out of the 241 questionnaires mailed to American teachers, 45 were completed and returned (19%). Of the 45 teachers that responded, four were male and 41 were female. Sixty-six responses were returned by the Singapore teachers from the initial 141 questionnaires that were sent (47%). Out of the 66 Singaporean teachers who responded, 11 were male and 55 female. Given the method for obtaining the subject samples (see subject section), it was expected that these respondents were representative of those individual populations of grade school teachers in their respective countries. However, due to the statistically small sample size and the possible homogeneity across the groups being studied, the conventional alpha level of .05 may result in a low power level. Therefore, an alpha of .10 was chosen for the subsequent analyses to increase statistical power. A similar strategy has been used in previous cross-cultural research (see Kurtz et al., 1990).

The median number of students that teachers in the U.S. reported having in a classroom was 26, and a mode of 25 students was reported by nine teachers. Teachers in Singapore, on the other hand, taught a median of 38 students per classroom, and the mode of 40 students was reported by 14 teachers, see Table 1. A frequency distribution was also obtained for the number of years of teaching experience, and the American

TABLE 1

FREQUENCY DISTRIBUTION OF AMERICAN AND SINGAPOREAN STUDENTS PER CLASSROOM

American Classrooms			Singapore Classrooms		
# of Students	Frequency	%	# of Students	Frequency	%
8	1	2.2	3	4	6.1
15	1	2.2	7	1	1.5
17	1	2.2	12	1	1.5
19	1	2.2	20	1	1.5
20	2	4.4	22	1	1.5
21	1	2.2	25	2	3.0
22	3	6.7	26	1	1.5
23	2	4.4	30	4	6.1
25	9	20.0	32	1	1.5
26	2	4.4	33	1	1.5
27	6	13.3	35	4	6.1
28	2	4.4	36	3	4.5
29	1	2.2	37	5	7.6
30	6	13.3	38	5	7.6
31	2	4.4	40	14	21.2
33	2	4.4	41	1	1.5
35	1	2.2	42	9	13.6
38	1	2.2	43	2	3.0
39	1	2.2	44	5	7.6
Mean=26			Mean=34		

teachers ranged in experience from one to 423 months (about one month to 35 years, with a mean of 13.4 years), and the experience of the Singaporean group ranged from 10 to 396 months (10 months to 33 years, with a mean of 15.1 years), $t(109) = -.78$, $p = .435$. For data analysis, both groups were separated at the combined median--13 years (i.e., those teachers who had taught 13 years or more were classified as "experienced teachers").

The teachers were also grouped according to the reference age of the children they taught; specifically, six and seven-year-olds, and eight and older. The bifurcation of the groups was based on the distinction Piaget made between these age groups in his cognitive-stage theory. Piaget considered children between two to seven years of age as preoperational, and children at this stage display rigidity of thought, in particular centration--the tendency to attend to or focus on one salient feature of an object or event and ignore other features (Miller, 1989). These limitations could affect the ability of children in this age group to effectively use certain memory strategies. Furthermore, according to Neimark, Slotnick, and Ulrich (1971), certain mnemonic strategies are not spontaneously employed by children younger than eight years, although a clear developmental increase is evident between eight years and adulthood.

Teachers had the opportunity to indicate all the grade levels they taught on the questionnaire, and 18 of the American teachers taught six and seven-year-olds and 36 taught children eight and older. Thirty-three Singapore teachers taught six and seven-year-olds and 85 taught the eight-year-olds and older. Although a teacher may teach several different grade levels, they were asked to keep a particular age group that they

taught most frequently in mind when they responded to the questionnaire. Eleven American teachers had the six and seven-year-olds as their reference group, and 36 American teachers referred to the eight-year-olds and older. The numbers for the Singapore teachers were 10 and 56 respectively.

A mixed-model analysis of variance, with country of origin and teacher experience as between-subjects factors, and the performance scores of both groups of teachers as the within-subjects factor, was conducted to examine possible differences between American and Singaporean teachers on sections C, D, and E of the questionnaire.

Additional log-linear, multiple response, crosstabs, and Pearson correlational analyses were performed to examine the relationship between culture, length of teaching experience, subject, and grade level taught, with metamemory knowledge and strategy preference. The results of the analysis of variance revealed no global differences on the performance scores between the two groups of teachers based on country of origin and teacher experience for sections C, and E. Specifically, no main effects for country of origin were found for sections C, D, and E, $\underline{F}(1, 102) = 2.033$, $\underline{p} = .157$, $\underline{F}(1, 89) = .218$, $\underline{p} = .642$, and $\underline{F}(1, 106) = .020$, $\underline{p} = .889$ respectively. However, a main effect was found for teacher experience for section D, $\underline{F}(1, 89) = 5.496$, $\underline{p} = .021$, but not for sections C, and E, $\underline{F}(1, 102) = .375$, $\underline{p} = .541$, and $\underline{F}(1, 106) = .034$, $\underline{p} = .854$ respectively. Country of origin and teacher experience did not enter into any significant interactions for all three sections.

In order to assess the relationship between strategy choice, type of task, culture,

and reference age of the children (for section C), a log-linear analysis was conducted. The log-linear analysis was performed due to the nature of the questions posed to the teachers in that section (i.e., teachers had a choice of picking several strategies), and because of the need to examine the combination of factors (strategy choice, type of task, culture, and reference age), and any possible change in strategy choice over the different task situations. Culture, reference age, problem type, strategy choice, response decision (whether the strategy was selected or not), and subsequent interactions were added hierarchically to the log-linear model. The results of the analysis indicated that the model containing all the two way interactions, and none of the three or four way interactions, provided the best fit of the data, $\chi^2(43, N=4,713) = 34.43$, $p = .82$. The significant two way interaction between strategy choice and problem type $\chi^2(12, N=4,713) = 210.28$, $p < .0001$ suggests that teachers' responses to the different strategy choices differed depending on the nature of the problem posed to them.

Cultural Differences

Multiple response analyses were carried out in conjunction with the log-linear analysis to identify where the performance of teachers differed. The multiple response analysis is the most appropriate test for items that have categories that are not mutually exclusive, such as the items in the questionnaire, where respondents have the ability to pick one or a combination of strategies they think is best suited for the task (SPSS Incorporated, 1988).

On the closed-ended question, multiple response analyses revealed that the teachers' choice between rehearsal and elaboration strategies on the shopping list task

differed by country of origin. On this task teachers were asked to assist students in remembering a list of categorizable items. As presented in Table 2, 21% of the Singapore teachers suggested rehearsal in addition to the other possible strategies to help students remember the list, whereas only 12% of the American teachers did so, $\chi^2(1, \underline{N} = 111) = 4.02$, $\underline{p} = .045$. For the American teachers, rehearsal was lowest on their choice of strategies. Thirty-two percent of the American teachers, compared to only 24% of the Singaporean teachers suggested elaboration as an alternative, $\chi^2(1, \underline{N} = 111) = 3.33$, $\underline{p} = .068$.

Another area where it was apparent that the teachers' choices differed was in the art activity task. Teachers were asked to report their strategy preference for helping students remember to bring a piece of fruit to art class, and the Singaporean teachers (71%) were not significantly different in suggesting the reminder strategy (the appropriate strategy) from the U.S. teachers (54%), $\chi^2(1, \underline{N} = 109) = 1.11$, $\underline{p} = .291$. American teachers were, however, once again more inclined to suggest elaboration (21%) than their Singaporean counterparts (7%), $\chi^2(1, \underline{N} = 109) = 8.95$, $\underline{p} = .003$.

Teacher Experience and Number of Suggested Strategies

It was also expected that teachers with less experience would select a wider range of memory strategies than their more experienced colleagues and that they would also suggest more strategies for the open-ended questions (see introduction). Furthermore, the variety of subjects teachers taught may influence the number as well as appropriateness of the suggested strategies.

In order to examine this hypothesis, a Pearson correlation coefficient analysis

TABLE 2

PERCENTAGE OF TEACHERS' STRATEGY PREFERENCE ON THE SHOPPING LIST TASK AS A FUNCTION OF COUNTRY

Strategy	U. S.	Singapore
Clustering	36	40
Instruct/Remind	20	16
Rehearsal	12	21
Elaboration	32	24

was performed. The results indicated that although teacher experience was negatively correlated to number of strategies suggested for section C (closed-ended questions), $r(111) = -.10$, $p = .298$, it was not similarly correlated in section D (open-ended questions), $r(97) = .07$, $p = .530$.

The results, on the other hand, did indicate that teacher experience was positively correlated to the total score for section D, $r(97) = .23$, $p = .022$. That is, teachers with less experience obtained lower scores, and the more experienced teachers obtained higher scores. However, as shown in Table 3, there was not a significant relationship between teacher experience and the number of strategies suggested for that same section, $r(97) = .07$, $p = .530$. In other words, teachers with less experience did not suggest fewer strategies, and teachers with more experience did not suggest more strategies. Given these results, it appears that although the experienced teachers did not suggest a greater number of mnemonic strategies, they were ultimately more accurate and effective in their choice of strategies.

Finally, the crosstabs analysis performed on the last section (section E) revealed that 66% of teachers with less experience thought that it was important for children to discover their own strategy compared to 53% of the more experienced teachers, $\chi^2(2, N = 111) = 5.26$, $p = .072$. However, a follow-up analysis separating the respondents by country revealed that U.S. teachers with less experience were similar to their more experienced colleagues in their beliefs on the need for strategy self-discovery. Specifically, 65% and 68% respectively thought that it was important for children to discover their own memory techniques, $\chi^2(2, N = 45) = .114$, $p = .945$.

TABLE 3

CORRELATION COEFFICIENTS BETWEEN TEACHER EXPERIENCE, NUMBER OF SUBJECTS TAUGHT, AND PERFORMANCE ON SECTIONS C AND D

	Total Strategy C	Total Score C	Total Strategy D	Total Score D
Teacher Experience	-0.099	-0.100	0.065	0.232*
Number of Subjects	0.328***	0.125	0.132	0.063

Note: * $p < .05$
** $p < .005$
*** $p < .001$

The difference, therefore, stemmed mainly from the beliefs of the Singaporean teachers, $\chi^2(2, \underline{N} = 66) = 7.10$, $\underline{p} = .029$. Sixty-seven percent of the Singaporean teachers who had less experience believed that it was important for children to discover their own memory strategies, whereas only 44% of their more experienced colleagues shared the same belief. The majority (56%) of the more experienced teachers from Singapore placed less emphasis on the need for children to develop or discover their own strategy for remembering.

Performance and Strategy Preference as a Function of Subjects Taught

Also of interest was the relationship between the variety of subjects taught and teachers' performance on the questionnaire (i.e., in terms of number of strategies suggested). Although a significant correlation in the predicted direction was obtained between these two variables for section C (i.e., closed-ended questions), $\underline{r}(111) = .33$, $\underline{p} < .001$, the relationship between subjects taught and total number of strategies suggested for section D was not significant, $r(97) = .13$, $p = .198$. Based on this outcome it could be argued that since section D consisted of open-ended questions, it was, therefore, less prone to random guessing, and as a result, a better indicator of accuracy. In other words, if the number of subjects teachers taught did have a positive influence on the number of memory strategies they suggested, it should also be evident in their performance on section D. Since this was not the case, the significant correlation found in section C may be an artifact of the closed-ended questionnaire.

In order to examine any possible differences in strategy preference between the English, Math and Science, and other subject area teachers, multiple response analyses

were conducted separately on the choices of the American and Singapore teachers on the word list task as a function of the subjects they taught. From the analysis of the American teachers it was found that 53% of English teachers, 54% of math and science teachers, and 52% of the social studies and religion teachers suggested rehearsal; and 78%, 77%, and 77%, respectively suggested elaboration on the word list task.

When the Singapore teachers were examined, nonsignificant differences were similarly found between the teachers of the different subject areas of interest, namely English, Math, and Science. However, the analysis did reveal that 80% of the Singaporean teachers who taught a nonEnglish language (NEL) were more inclined to suggest rehearsal on the word list task, see Table 4. In contrast, only 25% of teachers teaching a non-English language suggested rehearsal on the foreign language task where teachers were asked to suggest strategies for teaching Latin to their students, $\chi^2(1, \underline{N} = 27) = 19.77, \underline{p} < .000$.

Reference Group Differences

Finally, multiple response analyses were conducted on the data from the word list task, broken down by country of origin and age level. It was found that 37% of the Singapore teachers who taught six and seven-year-olds chose rehearsal, in comparison to 28% of their U.S. counterparts, $\chi^2(1, \underline{N} = 21) = 4.49, \underline{p} = .034$ (see Table 5). Twenty-two percent of the Singapore educators and 32% of the American teachers of six and seven-year-olds instead chose elaboration, $\chi^2(1, \underline{N} = 21) = .38, \underline{p} = .537$. When reference was made to the older age group, 38% of the Singapore teachers and 35% of the American sample who taught eight-year-olds and older chose elaboration, a

TABLE 4

PERCENTAGE OF SINGAPORE TEACHERS' STRATEGY USE ON THE WORD LIST AND FOREIGN LANGUAGE TASKS AS A FUNCTION OF SUBJECT TAUGHT

	Rehearsal		Elaboration	
Subject Taught	WL	FL	WL	FL
Reading/English	56	61	77	36
Math/Science	53	64	79	33
Social Studies	62	61	80	41
Non-English Lang.	80	25	70	75

TABLE 5

PERCENTAGE OF TEACHERS' STRATEGY USE AS A FUNCTION OF COUNTRY AND AGE REFERENCE GROUP ON THE WORD LIST TASK

	U. S.		Singapore	
Strategy	Ages 6-7	Ages 8 & Above	Ages 6-7	Ages 8 & Above
Clustering	20.0	24.4	18.5	14.4
Instruct/Remind	20.0	19.2	22.2	20.2
Rehearsal	28.0	21.8	37.0	26.9
Elaboration	32.0	34.6	22.2	38.5

nonsignificant finding, $\chi^2(1, \underline{N} = 86) = .07$, $\underline{p} = .786$. Only 27% of the Singapore teachers and 22% of their American colleagues of eight-year-olds and older picked rehearsal, $\chi^2(1, \underline{N} = 86) = .12$, $\underline{p} = .727$. It is apparent from this outcome that American teachers tended to favor elaboration over rehearsal techniques regardless of age group, whereas Singapore teachers tended to favor the rehearsal strategy for the younger group of children they taught.

Finally, the multiple response analysis revealed that teachers' choice of strategies differed depending on the age of their students, regardless of any other factors. As shown in Table 6, 33% of teachers teaching six and seven-year-olds suggested rehearsal techniques over the other strategies, versus the 25% of teachers of eight-year-olds and older, $\chi^2(1, \underline{N} = 107) = 5.68$, $\underline{p} = .017$. Although statistically nonsignificant, 37% of teachers instructing eight-year-olds and older suggested elaboration strategies over the other techniques, compared to 27% of teachers of the younger group that did so, $\chi^2(1, \underline{N} = 107) = 1.16$, $\underline{p} = .282$.

Age-Appropriate Strategies

In order to assess teachers' expectations concerning the onset of skills necessary for children to successfully employ memory strategies, teachers were asked to estimate the age when children are first able to perform certain activities. For example, question C7 inquired about when teachers thought children are capable of using the imagery strategy; question C8 assessed their belief on the onset of the rehearsal strategy; and C9 the onset of children's grouping or clustering strategy. Although some of the results from the crosstabs analyses were not statistically significant, there were a few

TABLE 6

PERCENTAGE OF TEACHERS' STRATEGY USE AS A FUNCTION OF AGE REFERENCE GROUP ON THE WORD LIST TASK

Strategy	Ages 6-7	Ages 8 & Above
Clustering	19.2	18.7
Instruct/Remind	21.2	19.8
Rehearsal	32.7	24.7
Elaboration	26.9	36.8

differences, however, that may be worth highlighting.

For instance, when asked at what age children were capable of using imagery as a strategy, 43% of U.S. teachers believed that four and five-year-olds possessed the ability to employ this strategy, whereas only 32% of Singapore teachers were of the same opinion, $\chi^2(1, \underline{N} = 59) = 2.53$, $\underline{p} = .112$. On the whole, 25% of the Singapore teachers were more inclined to believe that imagery should be taught to older children than were American teachers (12%), $\chi^2(1, \underline{N} = 59) = 2.53$, $\underline{p} = .112$. This result, although only approaching significance, is consistent with the outcome from the earlier analysis which revealed that Singapore teachers who taught the older age group of children preferred elaboration over the other strategies.

The rehearsal task showed a similar trend, however, a larger majority of American teachers believed that rehearsal can be taught at a younger age. Specifically, 62% of U.S. teachers believed that children first begin to show they can use this strategy between one to three years of age compared to only 45% of Singapore teachers. In contrast, 29% of the Singapore teachers believed that children first begin to display the ability to use rehearsal when they are six years or older, compared to only 15% of the American teachers who selected this category, $\chi^2(1, \underline{N} = 82) = 3.32$, $\underline{p} = .069$.

CHAPTER V

DISCUSSION

On the whole, the results of this study indicate that there are some differences in memory strategy preference between American and Singaporean teachers, and that these differences are generally in the predicted direction. It must be mentioned that although global comparisons between the two countries, based on the scores on the individual sections of the questionnaire, were not significant, analyses carried out at the micro level (i.e., specific questions within each section) revealed interesting differences. Also, interesting differences were revealed regardless of culture, including the amount of experience teachers had, the subjects teachers taught, and the groups of children teachers referred to.

Cultural Differences

One of the main hypotheses of this study was that the difference in emphasis placed on certain cognitive abilities over others would be an important factor in influencing strategy preferences of teachers in the two cultures. Specifically, it was believed that American teachers would value elaboration type techniques due to the culture's emphasis on English language skills, and that Singaporean teachers would prefer rehearsal strategies due to the societal emphasis on math and science abilities (see Introduction section). It was hypothesized that this basic difference would manifest

itself in the global scores teachers obtained in the different sections as well as particular items of the questionnaire. However, the prediction that there would be differences in performance in terms of overall scores on the questionnaire, and that these differences could be accounted for by culture, remains unsupported. The scores Singapore and American teachers obtained were not significantly different on the C (closed-ended) and D (open-ended) sections of the questionnaire. There were, however, differences that were in the predicted direction--American teachers did tend to favor elaboration as a memory strategy over the other mnemonic techniques discussed. Singapore teachers, on the other hand, were differentiated in their preference for the rehearsal strategy depending on age-related variables. This is discussed in more detail below.

Teacher Experience

There were interesting results that emerged from the analyses on teachers' experience as a factor in influencing performance on the questionnaire. The main finding from this area was that teachers with more experience, despite not selecting a larger number of mnemonic strategies, were more accurate in suggesting appropriate memory techniques for the different tasks. This was especially evident from their scores on the open-ended section of the questionnaire. One hypothesis of this study was that teachers, based on their experience, develop theories on the factors they believe influence academic achievement. As these theories are tested and refined over the years, they develop a set pattern of teaching which is then applied across their individual educational settings. If this hypothesis is correct, it makes sense then that the more experienced teachers were more accurate in selecting the appropriate strategies

for the given tasks.

Another prediction was that teacher experience would influence the number of the suggested solutions to problems posed to the respondents. The results, however, lacked significance for the predicted inverse relationship between teacher experience and the number of strategies suggested: That is, teachers with less experience should offer a wider range of suggestions than the more experienced teachers. On the other hand, as previously discussed, despite being similar to their less experienced colleagues in terms of number of memory strategies suggested, teachers with more experience were ultimately more accurate in their strategy selection.

Another finding that emerged from the analyses was that the less-experienced teachers from Singapore were more similar to their Western counterparts than previously thought. Support for this interpretation may be found, in part, in the section that evaluated teachers' metamemory knowledge (section E). The less experienced Singapore teachers were similar to their American colleagues in terms of their accuracy in assessing the need to teach children memory strategies. The Singapore teachers with more experience, on the other hand, were less inclined to believe that children should be left to discover memory strategies on their own. Follow-up research should examine and compare the current educational philosophy in Singapore to determine its affinity to that of present American educational philosophy. Shared educational philosophy may account, in part, for the similarity between the less-experienced teachers in Singapore and their American counterparts.

Subjects Taught

The third hypothesis of this study was that the number of subjects taught would influence the number and appropriateness of selected techniques, as well as affect teachers' preference for particular mnemonic strategies. Academic subjects that require memorization of factual information, e.g., math and science, would elicit rehearsal strategies and that English language subjects, e.g., reading, and language arts, would elicit more elaboration-type strategies.

The results revealed that there was a significant relationship between the number of subjects taught and the number of strategies selected for the closed-ended section. However, a relationship was not found between the overall scores for sections D and E and the subjects teachers most frequently taught, suggesting that the variety of subjects teachers taught did not affect their accuracy in suggesting appropriate strategies for the different tasks. One possible reason for the discrepancy between the number of strategies selected on section C and the performance scores on sections D and E, could be random guessing and misinterpretation or misuse of terms, which are inherent causes for concern in closed-ended question formats.

Furthermore, the results indicated that frequently taught academic subjects did not appear to influence American teachers' preference for either elaboration or rehearsal strategies. However, when the Singapore sample was in turn examined, it was found that teachers' preference for either rehearsal or elaboration differed depending on the subject they taught, and the task in question. A much larger percentage of the non-English language (NEL) teachers in Singapore indicated a preference for rehearsal than

the other subject area teachers. However, when it came to suggesting a specific strategy for learning foreign words, NEL teachers were much more inclined to suggest elaboration instead. It is important to note that none of the American teachers that participated taught a non-English, or foreign language subject, and therefore, a cross-cultural comparison of NEL teachers' performance was not possible.

This result came somewhat as a surprise since it was expected, based on Sheridan's work (1992), that NEL teachers, especially those teaching the Chinese language, relied heavily on rehearsal as a method of instruction. This, however, appears to be simply an aberration due to the nature of the logographic system used in Chinese chirography, which confines rehearsal only to certain stages of that language instruction. Rehearsal is predominantly used, for instance, when one is at the phase of teaching students the intricate intonation system, or when teaching children to associate particular symbols to abstract or seemingly unrelated words (Sheridan, 1992). According to Sheridan (1992) the concentrated drill method, by the third year, is no longer a major method of instruction. Elaboration, on the other hand, tends to be more frequently used in the other stages of the language instruction and throughout the language teaching process.

Therefore, although no relationship emerged between the subjects taught (i.e., math, science, and English) and teachers' performance scores on the questionnaire, a relationship more complex than originally anticipated may exist. Cross-cultural research on memory development has in the past focused mainly on comparing literate and non-literate societies, and therefore, social vernacular, that is, in terms of the characteristics

of the expressed or written language had been inevitably, albeit implicitly, addressed. However, the role of language has not been closely examined as an independent factor in influencing preference for particular mnemonic strategies--the nature of a language could possibly be a more salient influence on particular strategy preference than the cognitive skills valued by the culture. Future research should elicit the participation of American teachers who teach a non-English language as a separate course to further examine the role of language as a factor in influencing memory strategy preference across cultures.

Reference Group Differences

Another finding that emerged from the analyses indicated that teachers, on the whole, were sensitive to the age group of their students when considering strategies for them. American teachers, however, were more inclined to suggest elaboration strategies over rehearsal strategies for certain tasks. Singapore teachers, on the other hand, tended to be more differentiated on their choice of strategies. Specifically, the analyses indicated that although Singapore teachers were more inclined to select rehearsal for their younger students, they, like their American counterparts, preferred elaboration as a strategy choice on those same problems for the older children.

CHAPTER VI

SUMMARY

Several interesting results emerged from this inquiry. On the whole, American teachers were more inclined to suggest elaboration over the other strategies, whereas Singaporean teachers tended to be more situation specific in their choice of strategies. Another finding was that experienced teachers were substantially more accurate than their less experienced colleagues in suggesting appropriate memory strategies for the various tasks. Most noteworthy was the discovery that the non-English language teachers from Singapore preferred rehearsal only when the task required remembering a list of unrelated English words, but instead favored elaboration when the goal was to learn foreign vocabulary. Thus, further research should be conducted to explore the role of language teaching in influencing educators' preference for memory strategies. It was also apparent that teachers were sensitive to the age group of their students when considering strategies for them. However, American teachers were much more inclined to suggest elaboration over rehearsal strategies, regardless of age groups. Singapore teachers, on the other hand, preferred the rehearsal strategy for their younger students, and instead suggested elaboration for the older children.

Future inquiries in cross-cultural research should also examine the actual memory performance and strategy use of children in the two cultures in order to better

explain how the differences seen between American and Singaporean teachers affect children's actual performances. Cultures that require children to use both rote rehearsal and elaboration techniques may enhance children's memory performance as a result of the versatility of their application to a wider range of situations and subject areas. It may also be that teachers' use of both rehearsal and elaboration strategies affect children's performances on various academic tasks in different ways. That is, it may be that rehearsal best facilitates performance on non-English language, math, and science tasks. Future research should explore these possibilities.

APPENDIX A

TEACHING STRATEGIES QUESTIONNAIRE

A1. Name of school:_____

A2. Type of school:

Public 01
or
Private:
Parochial 02
Non-religious 03

A3. Is your school located in the city or suburb?

City 01
Suburb 02

A4. Circle the grade or grades that you currently teach. Circle all that apply.

01 02 03 04 05 06

A5. What is the typical number of students in your classroom?

Number of students:_____

A6. What is the average (estimated) socioeconomic status of students in your class? Circle one.

Above middle class (upper class) 01
Upper middle class 02
Middle class 03
Lower middle class 04
Below middle class (around poverty level) 05

A7. Length of time you have been teaching:_____Yrs._____Mths.

A8. Your gender?

Male 1
Female 2

A9. Which best describes you? Circle one.

African American 01
Caucasian 02
Hispanic 03
Native American 04
Pacific Islander or Asian 05
Other 06
(Specify)_____

B1. How many classes do you teach in this school?_____

B2. What subjects are you currently teaching? Circle all that apply.

a. Reading 1
b. English/language arts 2
c. Mathematics 3
d. Social studies and/or history 4
e. Science 5
f. Religion 6
g. Social skills/life skills 7
h. English-as-a-second language 8
i. Other remedial instruction 9
j. Special education 10
k. Other 11
(Specify)_____

B3. Which one do you teach most frequently?_____

B4. Approximately what percent of your classroom time in the course of a typical school day is spent in the following activities? Total should equal 100 percent.

a. Academic interaction . . . . . _____%
b. Personal/social development of students . . . . . _____%
c. Noninstructional tasks (e.g., attendance) . . . . . _____%
d. Other classroom activities . . . . . _____%
TOTAL CLASSROOM TIME 100%

B5. Of the time you spend in academic interaction (Question B4-a), approximately what percentage is spent in the following activities? Total should equal 100 percent.

a. Presenting and/or explaining information . . . . . _____%
b. Monitoring student's academic performance . . . . . _____%
c. Leading discussion groups . . . . . _____%
d. Providing feedback to students on their academic performance . . . . . _____%
e. Other academic interaction activities . . . . . _____%
TOTAL ACADEMIC INTERACTION 100%

Please answer the following questions in sequence. When answering the questions, assume that the children you are referring to are in the same age group or grade that you are currently teaching. If you teach several classes of children from different age groups, keep in mind only the oldest group. Please refer to the same age group for all questions. If you feel that the task is not appropriate for the children you have in mind (i.e., if it is either too difficult or easy), modify it, but please indicate how you tailored the task to make it age-appropriate. As there is always a range in performance and ability, please keep in mind the average normal child.

Please indicate your reference age group here:_____

Please read the following terms before proceeding on.

GLOSSARY

Rehearsal
Repeating over and over item(s) to be remembered one at a time or in a group.

Clustering
Organization of information into small groups of items such that it aids the memorization process.

Elaboration
Strategy that aids memory by making or having the items do something together, or by putting them together in some way.

Instruction
Informing student(s) of the task and allowing them to develop or use their own strategy for remembering.

Keyword Method/Imagery
Similar to elaboration except that they are based on the use of mental imagery.

Reminder
Memory technique that uses an item that is related to the event or object, and which is placed strategically to serve as a reminder.

Please answer the following questions in sequence. Respond to all questions and do not skip pages. Please select an alternative you feel is most appropriate for the task described, and feel free to refer to the glossary for strategy terms.

C1. What do you do to help students remember? What strategies or special memory techniques do you teach your children in any subject area? Circle all that apply.

a. Clustering 1
b. Instruction 2
c. Rehearsal 3
d. Keyword Method/Imagery 4
e. Reminder 5
f. Elaboration 6
g. Other 7
(SPECIFY)_____

If you could, please explain why the strategy you chose will aid the memory process.

_____

C2. You are teaching a class and one of the assignments is to have your students remember the following list of words:

Close, grow, other, temperature, bright,
name, cover, angry, remove, sigh.

Indicate what you would suggest to your students if you want them to remember the list in the same order. This could, for example, be a task for remembering vocabulary items in which the students must recall the words without any hints or prompts. You may, however, provide suggestions and even directions to help them remember the items. Please keep in mind that the primary task is to help your students remember the list of words in the same order as given. Circle all that apply.

a. Clustering 1
b. Instruction 2
c. Rehearsal 3
d. Keyword Method/Imagery 4
e. Reminder 5
f. Elaboration 6
g. Other 7
(SPECIFY)_____

If you could, please explain why the strategy you chose will aid the memory process.

_____

C3. What technique or strategy would you encourage your students to adopt to remember the following shopping list? Assume that no paper or pencil is available for the children to use. Circle all that apply.

Fork, pencil, shoe, knife, orange,
socks, shirt, spoon, lemon, book, banana
tie, plate, ruler, apple, eraser.

a. Clustering 1
b. Instruction 2
c. Rehearsal 3
d. Keyword Method/Imagery 4
e. Reminder 5
f. Elaboration 6
g. Other 7
(SPECIFY)_____

If you could, please explain why the strategy you chose will aid the memory process.

_____

C4. You have just been assigned to teach art, and tomorrow you want each child to bring to class a piece of fruit to sketch. You do not want anyone to forget. Which of these methods would you suggest they use? Circle all that apply.

a. Clustering 1
b. Instruction 2
c. Rehearsal 3
d. Keyword Method/Imagery 4
e. Reminder 5
f. Elaboration 6
g. Other 7
(SPECIFY)_____

If you could, please explain why the strategy you chose will aid the memory process.

_____

C5. Teaching a foreign or second language is a challenging task. If you were required to teach your students Latin, how would you help them learn the following words? Circle all that apply.

hand - manus	paper - charta
chalk - creta	shirt - subucula
house - domus	chair - sella
ship - navis	shoe - calceus
leg - crus	map - tabula

a. Clustering 1
b. Instruction 2
c. Rehearsal 3
d. Keyword Method/Imagery 4
e. Reminder 5
f. Elaboration 6
g. Other 7
(SPECIFY)_____

If you could, please explain why the strategy you chose will aid the memory process.

_____

C6. The following are two lists of word-pairs. Please indicate which list in your opinion would be easier, and would take less time for your children to remember if all they have to do is respond with the second word of the pair when given the first. Be sure to read all items.

1.	2.
apple - window	hot - cold
cloud - table	walk - run
woman - triangle	moon - sun
frame - doctor	mouse - elephant
baby - tree	water - fire
	summer - winter
	thin - thick
	remember - forget

Which is easier? 1. or 2.

Take less time? 1. or 2.

Why?_____

_____

C7. There are different memory strategies that can improve performance on memory tasks. One such strategy is to make or have the items do something together, or put them together in some way using mental imagery. For example, to remember the words "bird" and "car," one could imagine a giant bird flying off with a car. At what age do children first begin to show that they can use this strategy? Circle one of the following.

a. 0 - 1 years old 1
b. 2 - 3 years old 2
c. 4 - 5 years old 3
d. 6 - 7 years old 4
e. 8 - 9 years old 5
f. 10 - 11 years old 6
g. 12 - 13 years old 7

If you could, please provide a typical example:_____

C8. Rehearsal is another strategy frequently used to aid memory. It involves repeating over and over the items to be remembered one at a time or in a group. At what age do children first begin to show that they can use this strategy?

a. 0 - 1 years old 1
b. 2 - 3 years old 2
c. 4 - 5 years old 3
d. 6 - 7 years old 4
e. 8 - 9 years old 5
f. 10 - 11 years old 6
g. 12 - 13 years old 7

If you could, please provide a typical example:_____

C9. At times grouping or organizing items into coherent categories aids the memorization process. For instance, if a child was presented 15 toys and asked to remember them, she or he could group the toys by either color, size, shape, or type (i.e. stuffed toys, games, dolls, etc,). At what age do you think children are first able to use such a strategy?

a. 0 - 1 years old 1
b. 2 - 3 years old 2
c. 4 - 5 years old 3
d. 6 - 7 years old 4
e. 8 - 9 years old 5
f. 10 - 11 years old 6
g. 12 - 13 years old 7

If you could, please provide a typical example:_____

Please answer the following questions in sequence, and as completely as possible. Please feel free to use additional paper if you run short of space, but indicate on the other sheet the corresponding number of the question with your answer.

D1. A common task is for children to remember a series of numbers for a short time period. For example, you may need a student in your class to report her/his registration number to the office clerk. What strategy would you suggest to help her/him to achieve this goal? Assume that you do not have a pen or paper handy and you do not want to risk your student losing the only list you have. This is the series of numbers to remember:

9276584361

D2. You are trying to help a student perform a task by introducing the idea of organizing and grouping items into categories, and he/she is not able to do it successfully, what would you then do?

D3. Once again, you are trying to help a student with a memory task by suggesting that (s)he make or have the items do something together or relate them together in some way. For instance, to remember the items "rolling pin" and "nail," you could recommend that the child imagine a nail being pounded into the rolling pin. However, your student is not able to understand or employ this strategy successfully. What would you then do?

E1. How often do you explicitly instruct your students in memory strategies? Also, do you teach them that different strategies are effective for particular tasks and not for others?

Frequency of explicit instruction:_____

Instruction on effectiveness of particular strategies:_____

Please rate the following in terms of their relationship to memory performance:

E2. Children's knowledge of specific memory strategies.

Very important								Not important
				Neutral				
1	2	3	4	5	6	7	8	9

E3. Informing learners that the trained strategy improves memory performance.

Very important								Not important
				Neutral				
1	2	3	4	5	6	7	8	9

E4. Children should be allowed to discover memory strategies on their own.

Very important								Not important
				Neutral				
1	2	3	4	5	6	7	8	9

E5. Explicit instruction given to students on the use and application of the various memory strategies.

Very important								Not important
				Neutral				
1	2	3	4	5	6	7	8	9

E6. Children should only be taught one strategy, and instructed on how to use it well, so as to avoid confusing them.

Very important								Not important
				Neutral				
1	2	3	4	5	6	7	8	9

E7. Of all the strategies you use, which **one** are you most comfortable with?

a. Clustering 1
b. Instruction 2
c. Rehearsal 3
d. Keyword Method/Imagery 4
e. Reminder 5
f. Elaboration 6
g. Other 7

(SPECIFY)_____

Please write down any comments you may have in the space provided.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

PLEASE CHECK TO SEE THAT YOU HAVE RESPONDED TO ALL QUESTIONS.
THANK YOU VERY MUCH FOR YOUR TIME AND EFFORT IN COMPLETING THIS QUESTIONNAIRE.

APPENDIX B

CODING FOR TEACHING STRATEGIES QUESTIONNAIRE

A2. Frequency - code as 1, 2 or 3

A3. Frequency - code as 1 or 2

A4. Average out the number of different grade levels taught

A5. Code # of students as indicated

A6. Code as indicated

A7. Code in total # of months

A8. Frequency - 1 or 2

A9. Frequency - 1- 5

B1. Average out # of classes taught

B2. Frequency - 1-11

B3. Code # that corresponds to B2

B4. Average out a's, b's, c's and d's

B5. Average out as in B4

Do frequency for reference age group

C1. Frequency - 1-7
1 bonus point if g (7) is an appropriate strategy not listed

C2. 4 points for selecting 4 (d) image-based elaboration
3 points for selecting 3 (c) rehearsal
2 points for selecting 6 (f) verbal elaboration
1 bonus point for selecting 4 and 3 or 6

1 bonus point if 7 (g) is an appropriate strategy not listed
2 points deducted if 1, 2, or 5 are selected or if inappropriate strategy suggested for 7
3 points deducted & 0 bonus points if 6 strategies or more are circled

C3. 4 points for selecting 1 (a) clustering
3 points for selecting 4 (d) image-based elaboration
2 points for selecting 3 (c) rehearsal
1 point for selecting 6 (f) verbal elaboration
1 bonus point for selecting 1 and 4, 3 or 6
1 bonus point if 7 (g) is an appropriate strategy not listed
2 points deducted if 2 or 5 are selected
6 points deducted & 0 bonus points if 6 strategies or more are circled

C4. 4 points for selecting 5 (e) reminder
3 points for selecting 4 (d) image-based elaboration
2 points for selecting 3 (c) rehearsal
1 point for selecting 6 (f) verbal elaboration
1 bonus point for selecting 5 and 4, 3, or 6
1 bonus point if 7 (g) is an appropriate strategy not listed
2 points deducted if 1 or 2 are selected
6 points deducted & 0 bonus points if 6 strategies or more are circled

C5. 4 points for selecting 4 (d) image-based elaboration
3 points for selecting 3 (c) rehearsal
2 points for selecting 4 and 3
1 bonus point if 7 (g) is an appropriate strategy not listed
0 points if f is selected
2 points deducted if 1, 2, or 5 are selected
1 point deducted & 0 bonus points if 6 strategies or more are circled

C6. 2 points if 2 is chosen (for 1st part)
2 points if 2 is chosen (for 2nd part)
4 points if explanation indicates a relationship among words or that they are opposites or that related words take less study time

C7. 2 points if age range selected falls between 5-8 yrs. (3-5 / c-e)
0 points if b or f is selected
Deduct 2 points if 1 or 7 is selected

C8. 2 points if age range selected falls between 2-4 yrs. (2 & 3 / b & c)
0 points if a or d is selected
Deduct 2 points if 5, 6 or 7 is selected

C9. 2 points if age range selected falls between 7-9 yrs. (4 & 5 / d & e)
0 points if c or f is selected
Deduct 2 points if 1, 2 or 7 is selected

D1. 4 points if answer reflects chunking numbers
3 points for rehearsal
2 points for image-based or verbal elaboration
1 bonus point for primary method and rehearsal or elaboration suggested

D2. 4 points - resort to multiple-item rehearsal
3 points - resort to elaboration
2 points - attempt to simplify task or break task down to component parts or make task more concrete for the child
1 bonus point if 2 or more strategies are suggested

D3. 4 points - resort to verbal elaboration
3 points - resort to rehearsal
2 points - attempt to simplify task or break task down to component parts or make task more concrete for the child
1 bonus point if 2 or more strategies are suggested

E1. Frequency of instruction:
Code Very often as 3
Often or quite often as 2
Infrequently or never as 1

Effectiveness of instruction:
If yes code as 1
If no code as 0

E2-E6 In order for higher score to reflect greater accuracy of answer code in the following way:
For E4 and E6 code as indicated.
Reverse code for E2, E3 and E5 i.e. 1=9, 2=8, 3=7, 4=6 and vv.

(In order for lower score to reflect greater importance code as indicated)

****Note: Record the number of times rehearsal and elaboration strategies are spontaneously suggested

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VITA

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The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Masters of Arts.

September 1, 1994
Date

Director's Signature