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The Role of Memory Strategies in Academic Achievement of Secondary School Students with Learning Disabilities

By
Kelechi Lazarus (Ph.D.)
Dept. of Special Education, University of Ibadan, Nigeria
E-mail: ppadaeze@yahoo.com

Abstract

Memory represents a core cognitive or psychological process that enables learners to achieve optimally in their academic pursuits. Without efficient use of memory strategies, students with learning disabilities who have problems with memory may not succeed in their studies. These students may have the ability to process information, but, they do so with great inefficiency. It is atypical for most students with learning disabilities to be unaware of basic strategies that effective learners use in their academic activities. Most authorities recognize that students with learning disabilities have uneven development of cognitive skills. They also agree that the demands of the secondary curriculum can place a strain on the student's capacity to attend to the varied sources of input from teachers, instructional materials, and peers. Besides, many educators and psychologists maintain that for effective instruction for students with learning disabilities teachers must understand the flow of information among three types of memory: sensory register, working (short-term) memory, and long-term memory. There is also particular concern about memory and executive function. Teaching implications based on the information model of learning was also discussed. Therefore, teachers of student with learning disabilities should ensure that their students acquire and use memory strategies used by efficient learners. If this is done, academic achievement for these students in major subject areas such as reading, mathematics, written expression, speaking and listening will improve.

Key words: Learning disabilities, Memory strategies, Academic achievement

Introduction

Memory strategies are important techniques for school success especially, for students with learning disabilities. Perhaps this is one of the reasons why teachers are continuously encouraged to ensure that their students particularly, those with learning disabilities learn and utilize memory strategies in their academic endeavours. At all levels of academic pursuit, effective and efficient memory is critical for school success. Students are constantly bombarded with new knowledge in various subject areas in which they may or may not be interested in. They are also expected to both learn and demonstrate the mastery of this knowledge on a regular basis. As students progress from one level of study to the next, new information is generally highly specific and builds on existing knowledge. As a result, these students have to process varied kinds of information in order to scale through in their studies. If a student is deficient in memory skills that student may not be able to go through his academics effectively.

Interestingly, it is well documented that students with learning disabilities have difficulty remembering academic content (for example. mathematics facts, words, and rules) or even directions. Students with learning disabilities usually have problems remembering auditory and visual stimuli. Students fail to use strategies that other students without disabilities readily use. For example, in learning a list of words, students without disabilities will rehearse the names to themselves or group the words in categories for studying. Generally, students with learning disabilities do not use these strategies spontaneously. This trend can be discouraged, if not completely eradicated if adequate instruction in memory strategies is provided by teachers.

For instance, once students with learning disabilities learn how to use a certain memory strategy, this will enhance their personal effectiveness and their ability to organize and retrieve information. Consequently, their overall academic achievement improves and they become efficient learners like their counterparts who go through

learning without struggling. Therefore, without the application of memory strategies, learning will be an arduous task for many students.

Lerner (2000) believed that most of the academic learning problems encountered by students with learning disabilities are traceable to memory problems that are actually as a result of faulty information processing of students with learning disabilities. According to her, these students encounter several problems in the acquisition of basic skills such as reading, writing, listening, spelling, speaking, reasoning or mathematics, simply because after the initial reception of information the human brain of these students fails to perform its processing function effectively, as a result, retrieval and recall of such information is distorted.

In the view of Mastropieri and Scruggs (1998) a common characteristic of students with learning disabilities is having problems remembering verbal information. Students who have deficits in registering information in short-term memory often have difficulty remembering instructions or directions they have just been given, what was just said during conversations and class lectures and discussions, and what they just read. Students who have difficulty with working memory often, forget what they are doing while doing it. For example, they may understand the three-step direction they were just given but forget the second and third steps while carrying out the first step. If they are trying to solve a mathematics problem that has several steps, they might forget the steps while trying to solve the problem. When they are reading a paragraph, they may forget what was at the beginning of the paragraph by the time they get to the end of the paragraph. These students will look like they have difficulty with reading comprehension. In fact, they do, but the comprehension problem is due to a failure of the memory system rather than the language system.

Students who have deficits in the storage and retrieval of information from long-term memory may study for tests, but not be able to recall the information they studied when taking the tests. They frequently have difficulty recalling specific factual information such as dates or rules of grammar; they have a poor memory of material they learnt earlier in the school year or last year. They may also be unable

to answer specific questions asked of them in class even when their parents and/or teachers think they really know the information.

Moreover, the Alberta Learning CALM Guide to Implementation (2002) maintained that each student with a learning disability has a different pattern of strengths and needs that affects learning. They noted that characteristics of students with learning disabilities include problem with the information-processing domain which includes problem with how information is received through the senses, attended to, perceived, organized, stored in memory, retrieved and expressed. By problem in the information-processing domain The Alberta Learning CALM Guide to Implementation (2002) meant that students may demonstrate the following specific characteristics: inconsistent attention, difficulty with fine details, poor recall of facts, limited automatic recall, and fine motor difficulties.

Memory strategies can be also used by teachers and parents (Lerner, 2000). To use memory strategies effectively, teachers often endeavour to understand the learning styles of their pupils. This knowledge would enable them to vary their presentations so that they can use a variety of teaching styles. Each student learns best in his or her own preferred way so, when information is presented using varied formats, the teacher increases the probability of reaching a larger proportion of the students in the classroom. For parents, they can incorporate memory strategies when they assist their children to complete home works and assignments. As the parent models the use of appropriate memory strategy, the student observes and can then apply same strategies at a later time during independent study. These goes to illustrate that memory strategies are flexible tools that educators find handy to apply in order to improve academic outcomes of all students.

Given this background, the focus of this paper is to examine the role of memory strategies in improving academic achievement of secondary school students with learning disabilities. The information-processing model of learning and the multistore memory system are presented. Strategies to improve memory skills for each type of memory are highlighted.

Theoretical Framework

Information Processing Model of Learning

The theoretical framework that underlies this paper is no other, then, the information processing model of learning. The information processing model of learning traces the flow of information during the learning process from the initial reception, through a processing function, and then to action. This model depicts the components of input, output, memory, and executive control function.

Lerner (2000) created a scheme to help us understand the information processing theory by comparing the human brain to a computer. According to her, information processing easily relates to computer, Input-Processing-Output. With a computer, there are input devices (such as keyboard), processing function (the central processing unit of the computer), and output devices (for example, monitor screen). In the human learning system, there are inputs such as auditory stimuli, visual stimuli, environmental stimuli and others (which could be internal or external); processing functions such as associations, thinking, memory and decision making, and output such as actions and behaviours (talking, writing, learning, motor response etc).

Thus, like the computer, the human brain takes in information (input), stores, and locates it (memory systems), organizes information and facilitates operations and decisions (central processing system-executive functions) and generates responses to the information (output) (Geotz; Hall, & Fetsco, 1989).

Processing information involves subroutines or procedure. Subroutines are performed in a hierarchical manner to complete tasks. To illustrate this flow of information, a student is shown a word (input stimulus). The student searches memory to recognize the word and determine its sound and meaning (processing and executive function) and finally, says the word (output performance). If the memory of the word has decayed or is lost, the individual will be unable to recognize or say a word. In this manner, students are constantly required to actively process, store and retrieve information and teachers are expected to help learners to develop information processing skills and apply them systematically to mastering the curriculum.

Atkinson and Shiffrin (1968) proposed a three-store or multistore memory system that actually conceptualizes a flow of information among three types of memory namely: sensory register, short term memory and long-term memory. These three stores are structurally distinct because they hold information differently, for varying times, and for different purposes. According to these scholars, the three stores lose information differently.

Sensory Register

In the sensory register, a copy of an experience is stored very briefly, perhaps for a few seconds. This component of memory holds the information received in more or less its original, unencoded form. Ormrod (2003) reiterated that probably everything that an individual's body is capable of seeing, hearing, and otherwise sensing is stored in the sensory register. In other words, the sensory register has a large capacity; it can hold a great deal of information at one time. However, teachers and learners must apply caution in respect to the sensory register. Since information stored in the sensory register doesn't last very long, whatever information that isn't moved to the working memory is probably lost, or forgotten. Therefore, to keep information for any time at all, then, we need to move it to working memory (Lerner, 2000, Ormrod (2003).

Teachers should ensure therefore, that students are attentive during lessons. As a result, teachers should endeavour to see that their lessons are planned to initially spark the attention of the student.

Working (Short-Term) Memory

The working (short-term) memory serves as a temporary storage facility. The individual is consciously aware of the new information which replaces the old information in the short-term memory. The old information either decays and is lost or is placed into long-term storage. Information in the working memory can last only five to twenty seconds at most without rehearsals, longer if practiced. Thus, working memory is obviously not the "place" to leave information that you need for examination later in the week, or even for information that you'll need for a class later today.

Working memory plays an important role in facilitating the comprehension and mental representation of the immediate environment. It also allows for the retention of information about the immediate past, supports the acquisition of new knowledge, allows one to link ideas together, and to formulate relate, and act on current goals (Geake & Dodson, 2005). Deficits in working memory have been shown to be related to performance in academic tasks including literacy and mathematics. A limited-capacity working memory system has been shown to underlie some academic difficulties presented by children with diagnosed learning disabilities (Mrazik,,Bender, & Makovichuk, 2010).

Strategies to Improve Working (Short-Term) Memory

Students with learning disabilities may experience deficits in working memory which affects their ability to store new information and to retrieve previously processed information from long-term memory. The teacher should therefore ensure that the length of time information stays in short-term memory is extended. In order to do this, the following, memory strategies can be applied.

(a) Teach students to over-learn materials: students should be taught the necessity of "over-learning" new the information. Which is constant practice. Only until they are able to perform one error-free repetition of the material. However, several error-free repetitions are needed to solidify the information. Learner (2000) noted that if information stored in short-term memory is rehearsed, the process of forgetting it reduces. Also, rehearsal helps in transferring the information to long-term memory for example, when you look up a telephone number repeating the number may help you to remember it long enough to dial it.

(b) Teach students to chunk or group information. This is because it is easier to remember grouped information than isolated bits of information. Chunking refers to breaking up or reorganizing sentences into units of thought. A chunk places input into subsets that are remembered as single units. For example, a bank account number can be chunked into three groups: 016-

002-412 or a social security number can be chunked as follows: 123-44-1830 (Lerner, 2000). Also, reading material chunked into meaningful units facilitates reading comprehension and efficiency (Casteel, 1988–89).

(c) Teach students to organize the content systematically. This makes the information less complicated and related the parts to each other. For example food groups can be organized into subparts and the information processed one at a time: dairy, cereals, meat, fruits and vegetables).

(d) Make the information meaningful: It is necessary to link new information to what students already know or their past knowledge. Therefore, teachers should provide background knowledge during teaching. Smith (2007) noted that once content and assignments are anchored to students' experiences and interests, students will remember easily. It is important to note that information stored in the short-term memory can remain active 15-20 seconds without rehearsals, longer if practiced.

Long-Term Memory

Long-term memory is the permanent memory storage. It is the final component of the human memory system. Ormrod (2003) noted that long-term memory has three characteristics which are: a long duration, an essentially unlimited capacity, and a rich network of interconnections. Buttressing this further Ormrod (2003) made the following explanations. First, memories remain in long-term storage for a very long time perhaps a day, a week, a month, a year, or one's entire lifetime. Long-term memory is capable of holding as much information as a learner needs to store there. Theorists have discovered that the information stored in long-term memory is organized and interconnected to some extent. In order to learn and retain information for long periods of time, information must be transferred from short-term to long-term. Such information remains in the long-term memory permanently.

Lerner (2000) explained that the problem people face in long-term memory is not storage but retrieval, that is, how to recall (or

remember) information stored in long-term memory. Before one can think about a problem, the stored information must be retrieved from long-term memory and placed into short-term or working memory (or consciousness). This is the same way information saved in the computer must be loaded into the desktop before it can be used.

Distinction between Episodic and Semantic Memories

According to Lerner (2000) there are two types of long-term memory: episodic and semantic. Episodic memories are described as images which could be visual or other sensory images of events in one's life. It is the recall of personal experiences within a specific context or period of time. Episodic memory provides an individual with a personal history. For example, the episodic memory of one's first carnival might be triggered by the sound of a merry-go-round.

On the other hand, semantic memories consist of the storage of general knowledge, language, concepts, and generalizations. It is the organized knowledge that a person possesses about words and other verbal symbols. The accuracy of semantic memory can be verified through written testimonies in books and other documents, but this is not so with episodic memory.

The retrieval of odd bits of long-term memory is sometimes triggered by strange events. In other words, students with memory difficulties may have good episodic memory but experience more difficulty storing and accessing semantic memory. Hence, although they can remember the event, they may struggle to remember the concepts (Bos & Vaughn, 2006). For instance, it is possible to remember the phone number of a former school mate but more difficult remembering his or her name.

Strategies to Improve Long-Term Memory

In order to assist students especially those with learning disabilities to store and retrieve information in long-term memory, the teacher should teach students to apply the following memory strategies:

(i) Organizing schemes: Many recommended study techniques are methods of organizing information to make it easier to recall from long-term memory. For instance, students use a

word web to link key information about a country such as weather, rivers, crops, etc.

(ii) Using prior knowledge: Since new information that is linked to something the student already knows is much easier to retrieve, teachers must endeavour to build links between old and new knowledge. Students must realize that they should not only receive information but they should be able to interpret it and relate it to other knowledge.

(iii) Key words: According to Maststopieri and Scruggs (1998), a key word is a mnemonic technique in which a word is linked to another word that is familiar. The linkage is that part of the word (the initial sound or rhyming element) that is similar to the key word. The keyword method is useful when pairs of items, such as foreign language words, technical words or names, have to be learned.

(iv) Graphic organizers: They serve to activate the student's construction of the concept (scheme) in memory. They provide students with usual representations for their thinking and learning before, during, or after reading. They are effective for making abstract concepts more concrete, organizing and categorizing information, and depicting relationships among ideas. With this strategy, teachers can cluster ideas and words that go together for the student.

(v) Give directions in multiple formats: The issue is that students benefit from being given directions in both visual and verbal formats. The teacher can encourage the students to repeat the directions given and explain the meaning of these directions. By so doing, the students' understanding and memorizing of instructions is reinforced. Associations are strengthened when teachers provide information that appeals to a number of senses.

(vi) Give teacher-prepared handouts prior to class lectures: Class lectures and series of oral directions should be reinforced by teacher-prepared handouts. The handouts for class lectures could consist of a brief outline or a partially

completed graphic organizer that the student would use during the lecture.

(vii) Teach students to be active readers: One way of achieving this is to teach students with memory problems to underline, highlight, or jot key words down in the margin when reading chapters. The student can go back to re-read the underlined, or highlighted, portion. This strategy can enhance short-term memory registration and/or working memory when reading.

(viii) Prime the memory prior to teaching/learning: Cues that prepare students for the task to be presented are helpful. This is often referred to as priming the memory. For instance, when a reading comprehension task is given, students will get an idea of what is expected by discussing the vocabulary and the overall topic beforehand. This will allow them to focus on the salient information and engage in more effective depth of processing. Advance organizers also serve this purpose. An advance organizer is usually presented in advance of what is expected to be learned by the students, and the presentation of the material allows a student to mentally organise the new material with existing knowledge. The material can include the tasks that will be performed, topics to be presented, background information, new vocabulary, or anticipated student outcomes (Schloss, Smith, & Schloss, 2001).

(ix) Review material before going to sleep: To enhance retrieval students should be encouraged to review material right before going to sleep at night. Research has shown that information studied this way is better remembered.

(x) Use KWL to introduce a new unit or concept and find out what students know. It provides a visual link between prior information and a new concept.

K –What I already know	W – What I want to learn	L – What I learned

(xi) Use mind maps or semantic maps as pre- and post-learning activities to help students see what they have learned.

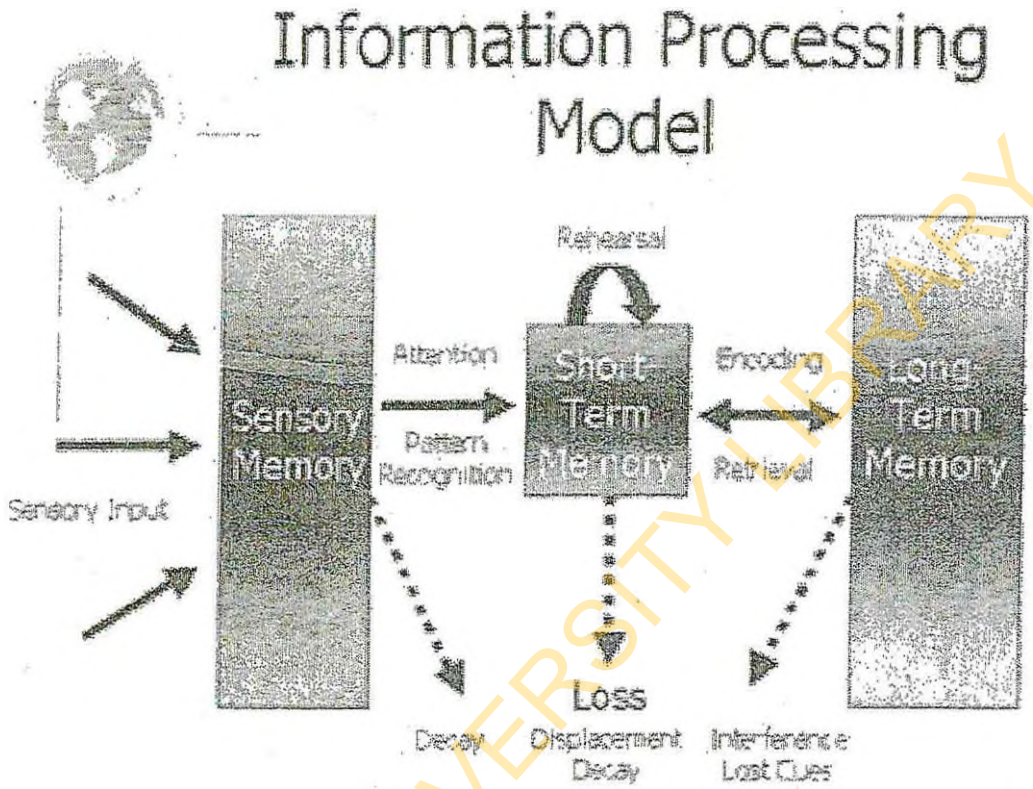
(i) Use daily reviews to encourage long-term storage; e.g., give a daily warm-up quiz asking one question based on a key concept from the previous class.

Executive Control and Metacognition

One important component of the information-processing model that deals with the course and the organization of one's own mental activity is executive control. It refers to the control and regulation of one's own thinking According to Lerner (2000) executive control directs the flow of thinking, manages the cognitive processes during learning, and keeps track of what information is being processed. It involves the planning, evaluating, and regulation of the information-processing routines.

Also, metacognition which can be best described as understanding and controlling one's thinking is often used in conjunction with executive control. In fact, executive decisions require metacognitive skills-skills that require "thinking about thinking." (Lerner, 2000). Thus, metacognitive functions require that students have knowledge of strategies to control their learning and are able to select the appropriate method for the problem at hand. The implication is that students must not only memorize information but they must also have the metacognitive skills to decide to use the information. Students must learn to activate and select the strategies to use the information they have. There are several learning strategies for metacognitve instruction available for students with learning disabilities.

A diagrammatic representation of the information processing model of learning is presented below:



Culatta, R. (2011). Cognitivism Innovative Learning. Retrieved on June 4, 2012 from www.innovativelearning.com/educational_psychology/ cognitivism

Evidence of Effectiveness of Memory Strategies

Many researchers have conducted studies on memory strategies with students with learning strategies. Some of these studies are reported below.

The keyword method was first used with undergraduates learning foreign language vocabulary. (Atkinson, 1975). Later, researchers found it to be effective with younger students without disabilities (Pressley, Levin, & Delaney, 1982). The effectiveness of the keyword method with learning disabilities is thought to reflect its emphasis on concrete proxy for the unfamiliar word, which is then shown interacting with the definition in meaningful illustration. As such, the keyword method emphasizes the strengths of students with

learning disabilities identifying words that should alike), and de-emphasizes relative weakness areas (for instance, rapid encoding of unfamiliar verbal information). With respect to vocabulary learning, Mastroprieri, Scruggs and Fulk, (1990) observed that the keyword method enhances learning of both concrete and abstract vocabulary, as measured by tests of recall and comprehension.

In another study conducted by Newman and Hagen (1981) memory strategies were examined among children, 7-13 years old, with diagnosed learning disabilities, in order to investigate whether they perform in appropriately active and efficient ways. The children were grouped at two age levels and administered tasks of serial recall and free recall. A strategy-training session was conducted on the second task. On the serial recall, neither age group showed evidence of rehearsal, in contrast to previous studies. On the free recall task, the younger children's performance was consistent with the mediation deficiency hypothesis, while the older children improved in sorting, clustering, and recall following training; that is, they showed a typical production deficiency. There was support for considering this sample and of learning disabled children as inactive learners, with potential for developmental change. Serial recall improved with age, and the older children's production deficiencies in free recall appeared to be ameliorated with training in organizational strategies.

Also, in a study by Carney and Levin (2000), college students used a mnemonic strategy to study and recall painting-to-artist matchings. All four experiments of the study, repeatedly showed that those students who used mnemonics substantially outperformed those who did not use them on tests that required recall of artists and their paintings.

In a study by Ajideh (2003) at English Department of Tabriz University in Iran, dramatic improvements in reading comprehension test scores were reported after teaching a group of intermediate-level students for one academic term, using a special focus on schema-theory-based pre-reading activities (for example, previewing, finding keywords, brainstorming, semantic mapping and questioning).

There are several studies (Barrera, Liu, Thurlow and Chamberlain, 2006; Casteel, 1988–1989; Hartley, 1992) that examined

forms of chunking as instructional tools to improve reading comprehension for students with disabilities. For example, Barrera et al., (2006) utilized a technique known as "chunking and questioning aloud" as a strategy to improve reading comprehension for English language learners with disabilities. This strategy involved reading small chunks of passages and stopping to check students' comprehension. Although the sample size was small, the findings suggested that this strategy did have a positive impact on reading comprehension levels. Hartley (1992) examined whether chunking text into sentences improved memory recall for 12–13 year old students. The results showed that this type of chunking did not have a significant impact on recall.

Swanson, Kehler, and Jerman (2010) investigated the effects of strategy knowledge and strategy training on the working memory (WM) performance in children (ages 10–11) with and without reading disabilities (RD) in two different researches. Experiment 1 examined the relationship between strategy knowledge (stability of strategy choices) and working memory performance as a function of initial, gain (cued), and maintenance conditions. Working memory performance was significantly improved for both groups under cued conditions; however, the performances of children with reading disabilities were inferior to those of children without reading disabilities across all memory conditions. Measures of working memory capacity rather than strategy stability or processing efficiency best predicted reading comprehension performance.

Experiment 2 assessed the effects of strategy training on working memory performance by randomly assigning children to strategy instruction or control conditions (Swanson, et al, 2010). Significant improvements in working memory performance occurred as a function of training conditions, but the residual working memory differences between the reading groups remained. Although the results showed that stable strategy choices, cued performance, and strategy instruction significantly bolstered working memory performance in children with reading disabilities, their overall working memory performance, however, was constrained by capacity limitations.

Finally, Mrazik, Bender, & Makovichuk (2010) examined one hundred and seven (107) adults who were pursuing post-secondary schooling. The participants were referred by career counsellors who suspected them to have undiagnosed learning disabilities. Participants underwent a cross-battery including assessment of intellectual, achievement, and verbal learning and memory. All participants met the criterion for a learning disability according to the DSM-IV. After controlling for full-scale IQ, analyses revealed significant partial correlations ($p<0.05$) between working memory, verbal learning and memory, and reading comprehension. Results from regression analysis indicated that working memory was a significant predictor of reading comprehension. Findings provide corroborating evidence of working and auditory memory deficits in adults with learning disabilities.

In all, it is obvious from the research evidences reviewed that effective use of memory strategies plays vital role in improving the educational performance of students with learning disabilities.

Conclusion and Recommendations

The present discussion has revealed that memory is one of the core cognitive or psychological processes that are affected by a learning disability. This is because a deficit in any of these cognitive processes involved in learning such as memory, perception, attention, metacognition and organization, can have a major impact on the ability of a student to learn information and apply it to any situation. As a result, affected students may experience difficulties in one or all academic areas such as reading, mathematics, speaking, written language and spelling. Thus, the condition of inability to maximize the use of memory strategies could actually lead to poor academic performance in given subject areas, overall school failure and eventual school dropout if not adequately addressed.

This paper describes the information processing model of learning as well as the multistore memory system and the implications of these cognitive skills for teaching students with learning disabilities. The sensory register, the working (short-term) memory, and the long-term memory, each perform vital roles in the storage, encoding and retrieval of information by students. Besides describing

the nature of each of these memory types, this paper has highlighted essential measures that teachers and their students should apply in order to develop and boost the memory skills be it at the sensory register, working (short-term) memory or the long-term memory. In addition, some research based evidence on the effectiveness of memory strategies for improving learning outcomes for students with learning disabilities were presented.

In view of the foregoing, it is recommended that teachers should:

(i) ensure that their lessons are planned to initially spark the attention of their students.

(ii) make new information meaningful by relating it to students' experiences and prior knowledge.

(iii) strengthen associations by providing information that appeals to a number of senses.

(iv). get adequate knowledge about their pupils' learning styles and present learning materials to cater for their pupils' learning styles.

(v) employ a variety of content enhancements in their classrooms such as the use of graphic organizers, advanced organizers, study guides, mind maps, word webs, and of course, mnemonic techniques like key words, peg words and letter strategies.

(vi) Use daily reviews to encourage long-term storage.

References

Ajideh, P. (2003). Schema theory-based pre-reading tasks: A neglected essential in the ESL reading class. *The Reading Matrix* 3:1-13.

Alberta Learning, Alberta, Canada CALM Guide to Implementation (2002). *Differentiating Instruction* Retrieved on June 10, 2012 from http://education.alberta.ca/media/313509/calm_ch7.pdf

Atkinson, R. C. (1975). Mnemonics in second-language learning. *American Psychologist,* 30, 823.828.

Atkinson, R. & Shiffrin, R. (1968). Human memory: A proposed system and its control processes. In K. Spence & J. Spence (Eds.), *The Psychology of Learning and Motivation: Advances in Theory and Research* (Vol. 2). New York: Academic Press

Barrera, M., Liu, K., Thurlow, M., & Chamberlain, S. (2006). *Use of chunking and questioning aloud to improve the reading comprehension of English language learners with disabilities* (ELLs with Disabilities Report No. 17). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.

Bos, C. S. & Vaughn, S. (2006). *Strategies for teaching students with learning and behaviour problems.* 6th ed. Pearson Education, Inc. Boston: Allyn and Bacon.

Culatta, R. (2011). Cognitivism: Innovative Learning. Retrieved on June 4, 2012 from www.innovativelearning.com/educational_psychology/cognitivism

Carney, R. N. & Levin, J. R. (2000). Mnemonic instruction with a focus on transfer. *Journal of Education Psychology,* 92 (4), 783-790.

Casteel, C. A. (1988–89). Effects of chunked reading among learning disabled students: An experimental comparison of computer and traditional chunked passages. *Journal of Educational Technology Systems, 17*(2), 115–121.

Geake, J. G. Dodson, C. S. (2005). A neuro-psychological model of the creative intelligence of gifted children. *Gifted and Talented International,* 20 (1), 4 -16.

Goetz, E., Hall, R. , & Fetsco, T. (1989). Information processing anc cognitive assessment:
Backgrounds and overview. In J. Hughes and R. Hall (Eds.) *Cognitive behavioural*
psychology in the schools: A comprehension handbook (pp. 87-115). New York: Guliford Press.

Hartley, J. (1992, August). *Does what goes in determine what comes out? Recalling structured text.* Paper presented at the Annual Meeting of the American Psychological Association, Washington, DC.

Lerner, J. W. (2000). *Learning Disabilities: Theories, Diagnosis and Teaching Strategies.* (8th ed.) Boston: Houghton Mifflin company.

Mastropieri, M. A., & Scruggs, T. E. (1998a).Enhancing School Success with mnemonic strategies. *Intervention in School and Clinic.* 33, 201 -208.

Mastropieri, M. A., & Scruggs, T. E. & Fulk, B. J. M. (1990).Teaching abstract vocabulary with the keyword method: Effects on recall and comprehension. *Journal of Learning Disabilities,* 23, 92-96

Mrazik, M., Bender, S. & Makovichuk, C. (2010). Memory functioning in post-secondary students with learning disabilities. *Research in Higher Education Journal,* Retrieved on June 10, 2012 from http://www.aabri.com/manuscripts/10486.pdf

Newman, R. S. & Hagen, J. W. (1981). Memory strategies in children with learning disabilities. *Journal of Applied Developmental Psychology,* 1, 297-312.

Ormord, J. E. (2003). *Educational psychology: developing learners.* 4th ed. Upper Saddle River, N. J: Merrill Prentice Hall.

Pressley, M., Levin, J. R. & Delaney, H. D. (1982). The mnemonic keyword method. Review of Educational Research, 52, 61-91.

Schloss, P. J., Smith, M. A, & Schloss, C. A. (2001). Instructional methods for secondary students with learning and behavior problems. Boston, MA: Allyn & Bacon.

Smith, D. D. (2007). Introduction to special education: making a difference. 6th ed. Boston: Allyn and Bacon.

Swanson, H. E. Kehler, P. & Jerman, O. (2010). Working Memory, Strategy Knowledge,
and strategy instruction in children with reading disabilities, *Journal of Learning Disabilities,* 43(1) 24– 47. Retrieved on June 21, 2012 from http://ldx.sagepub.com/cgi/content/abstract/43/1/24