THE VERBAL SHORT-TERM MEMORY AND READING ABILITY OF PRIMARY SCHOOL STUDENTS IN CHANAYETHARZAN TOWNSHIP

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Abstract

The main aim of this study is to investigate the effect of verbal short-term memory on primary students' reading ability. A total of 559 Grade 3 and Grade 5 students from eleven schools in Chanayetharzan Township, Mandalay Region were participated in this study. Quantitative approach was used in this study. Students' Verbal Short-term Memory was measured by "Verbal Short-term Memory tests" developed by Stanford-Binet Intelligence Scale: Fourth Edition (SB-IV). Researcher made reading ability tests (Myanmar and English) were used to measure primary students' reading ability based on the Metropolitan Achievement Tests (1978) and the Neale Analysis of Reading Ability (1989).

Results indicated that there was significant relationship between primary students' verbal short-term memory and reading ability. ANOVA results indicated that there were significant differences with regard to students' verbal short-term memory and reading ability by different schools. According to correlation analysis, students' verbal short-term memory were found to be significantly and positively correlated with their reading ability ($r = .664$, $p < .01$).In addition, multiple regression analysis showed that the students' verbal short-term memory was good predictor for their reading ability. Therefore, findings from this research may contribute to the educational field by providing recommendations for developing verbal short-term memory in students to support their reading ability.

Introduction

Educator must ensure that students attend to learning, attach new learning to previous learning, actively engage in learning, construct meaning and demonstrate their learning. All of this requires memory. Learning and memory are sensitive to the physical state of the learner. In 2002, Foster stated that there are four basic kinds of memory: sensory memory, short-term memory, working memory, and long-term memory.

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Verbal memory (VM) is a catchall phrase used to refer to memory for words and verbal items. Verbal short-term memory (VSTM) has been the subject of considerable psychological, neuropsychological and developmental research, culminating in successful theories such as the Phonological Loop of Baddeley.

Reading ability has a significant impact on all areas of academic learning. Poor reading skills at an early age can lead to an overall dislike of school and can increase the areas and can significantly impact on individual's education and future success (Ecklund and Lamon, 2008). Mann (1985) found that children who have had difficult learning to read often have poorer memory span than who succeed. The rationale for this research is based upon studies showing the importance of the relationship between STM and learning to read. Thus, measures of STM become important as predictors of children who will experience difficulty in school learning to read. Moreover, Sprugevica (2003) described that the other studies also have shown verbal short-term memory as a predictor of reading ability.

Purposes of the Study

The main purpose of this study is to investigate the effect of verbal short-term memory on reading ability of primary school students (Grade 3 and Grade 5) in Chanayetharzan Township. The specific objectives are as follows;

1. To investigate the relationship between primary students' reading ability and their memory for sentences, digits forward, digits backward and objects.
2. To explore the relationship between primary students' verbal short-term memory and their reading ability.
3. To observe the differences in primary students' verbal short-term memory and their reading ability based on grade and school.

Scope of the Study

A total of 559 Grade 3 and Grade 5 students from 11 randomly selected schools were participated in this study. The schools were located within Chanayetharzan Township, Mandalay Region. The participated students were

selected from No. (1) Monastic School Nanthar, No. (2) Monastic School Ngarsoet, No. (3) Monastic School Myatheintan, No. (4) Monastic School Thingazar, No. (5) Monastic School Thayetpin, No. (6) Monastic School Akautwon, B.E.P.S (29), B.E.P.S(32), B.E.P.S(41), B.E.H.S(22) and B.E.H.S(23) in Chanayetharzan Township, Mandalay Region.

Definitions of Key Terms

1. **Verbal Short-term memory:** Verbal Short-term Memory refers to the extremely capacity limited information processing ability, containing all linguistic information that is in immediate consciousness (cited in Baddeley et al., 1998).
2. **Reading Ability:**It is an ability to read that is expected for a child of a given age and stage of development.

Review of Related Literature

Memory is a wonderful trait of human beings and it generally plays a very important role in learning process, literacy knowledge acquisition. According to Baddeley et al.'s (1975), verbal short-term memory is only as long as the number of words perceived in approximately 1.6 seconds. Verbal short-term memory is traditionally assessed using tasks that require the participant to recall a sequence of verbal information, such as digit span and word span (Baddeley et al., 1998).

Snow, et al. (1998) described that reading is a complex act. It involves multiple cognitive, emotional, and social abilities, each of which influences the beginning reader's success. Indeed, reading ability has a significant impact on all areas of academic learning. Poor reading skills at an early age can lead to an overall dislike of school and can increase the risk of drop out. Low literacy levels can also lead to underachievement in all academic areas and can significantly impact an individual's education and future success. Wilfong (2008) stated that students who struggle with reading benefit from individual reading instruction and extra reading time.

Children who are read more frequently at an early age enter school with larger vocabularies and more advanced comprehension skills (Mol &

Bus, 2011). The reader brings motivation to the reading experience in the form of purpose, interests, and self-regulatory skills. Motivation to practice reading is integral in improving reading skills. Heckman (2002) mentioned that learning to read is a fundamental right of children in a changing world. Therefore, to achieve at school and succeed in the world at large, children need to know how to read and write.

Method and Procedures

The main purpose of this study is to investigate into the verbal short-term memory and reading ability of primary school students (Grade 3 and Grade 5) in Chanayetharzan Township.

Participants

A total of 559 Grade 3 and Grade 5 students from 11 randomly selected schools were participated in this study. The schools were located within Chanayetharzan Township, Mandalay Region. The participated students were selected from No. (1) Monastic School Nanthar, No. (2) Monastic School Ngarsoet, No. (3) Monastic School Myatheintan, No. (4) Monastic School Thingazar, No. (5) Monastic School Thayetpin, No. (6) Monastic School Akautwon, B.E.P.S (29), B.E.P.S (32), B.E.P.S (41), B.E.H.S (22) and B.E.H.S (23) in Chanayetharzan Township, Mandalay Region. Table 1 illustrated the number of Grade 3 and Grade 5 students from selected schools in Chanayetharzan Township.

Table 1: Selected Numbers of Primary Students from Chanayetharzan Township

Name of Schools	Number of Students				Total
	Grade 3		Grade 5		
	Male	Female	Male	Female	
No.(1) Monastic School	14	11	14	8	47
No.(2) Monastic School	12	2	8	3	25
No.(3) Monastic School	2	_	11	2	15
No.(4) Monastic School	11	_	10	_	21
No.(5) Monastic School	11	5	8	8	32
No.(6) Monastic School	13	_	10	_	23
B.E.P.S (29)	13	16	22	21	72
B.E.P.S (32)	21	25	15	20	81
B.E.P.S (41)	18	31	23	22	94
B.E.H.S (22)	7	22	8	34	71
B.E.H.S (23)	15	16	23	24	78
Total	**137**	**128**	**152**	**142**	**559**

Instruments

This section describes each of the measures used in the current study. All primary students (N=559) from the participating schools (N=11) were asked to complete the Tests for Verbal Short-Term Memory and Reading Ability Tests. These survey instruments take about two hours to complete.

Primary students' verbal short-term memory was consists of four subscales: memory for sentences, memory for digits forward, memory for digits backward and memory for objects which are adapted from The Stanford-Binet Intelligence Scales: Fourth Edition (SB-IV) (cited in Anastasi,1997). Moreover, researcher made reading ability tests were constructed with two subjects, Myanmar and English, to measure the students' reading ability based on the Metropolitan Achievement Tests (1978) and the Neale Analysis of Reading Ability (1989).

A total of 50 items consists of 8 memory for sentences, 8 memory for digits forward, 8 memory for digits backward, 8 memory for objects,

8 Myanmar reading ability tests and 10 reading ability tests for English subjects, respectively. In scoring the tests, the students were provided 32 marks for the completion of 32 multiple choice items of students' verbal short-term memory tests and 10 marks for the completion of 10 items of English reading ability tests. The scoring method was 1 for correct answer and 0 for wrong (incorrect) answer. But the reading ability tests for Myanmar Subject scored 10 marks for 8 items. Because of the Myanmar reading ability tests assess the students reading comprehension ability.

Data Analysis of Results

1. The Verbal Short-Term Memory and Reading Ability of Students

The responses in tests exposed that the mean scores and standard deviations of primary students' verbal short-term memory were 24.27 and 5.82 and their reading ability were 15.22 and 5.75 (see Table 1).

Table 1: The Results of Students' Verbal Short-Term Memory and Reading Ability

Variables	N	Mean	Std. Deviation	Minimum	Maximum
Verbal Short-term Memory	559	24.27	5.820	5	32
Reading Ability	559	15.22	5.750	2	20

These results showed that primary students' verbal short-term memory and reading ability were satisfactory in the present study.

2. Comparison of Primary Students' Verbal Short-Term Memory and Reading Ability by Grade

To investigate the difference between Grade 3 and Grade 5 in verbal short-term memory and reading ability, descriptive analysis was conducted.

Table 2: Mean and Standard Deviation of Verbal Short-Term Memory and Reading Ability by Grade

Variable	Grade	N	Mean	Std. Deviation
Verbal Short-term Memory	Grade 3	265	20.75	5.349
	Grade 5	294	27.71	3.687
Reading Ability	Grade 3	265	11.62	5.127
	Grade 5	294	18.47	4.113

Table 3: The Result of the *t*-test on Primary Students' Verbal Short-Term Memory and Reading Ability by Grade

Variable	*t*	*df*	*p*	Mean Difference
Verbal Short -Term Memory	-18.856	557	.000	-7.269
Reading Ability	-17.518	557	.000	-6.858

According to the result of the t-test, there were significant difference between Grade 3 and Grade 5 students in their verbal short-term and the reading ability of Grade 3 students was significantly different from Grade 5 students.

3. ANOVA Results for Primary Students' Verbal Short-Term Memory and Reading Ability by School

In this present research, the participated students were from different types of schools such as monastic school, primary school and high school. Therefore, it is necessary to compare their verbal short-term memory and reading ability by school.

Table 4: ANOVA Results in Differences among Primary Students with Different Schools

Variables		**Mean Squares**	**F**	**Sig.**
Verbal Short-Term Memory	Between Group	671.110	21.250	.000
	Within Group	31.582		
Reading Ability	Between Group	848.758	28.169	.000
	Within Group	30.131		

Table 5: Post Hoc Analysis of Primary Students' Verbal Short-Term Memory and Reading Ability among Schools by Tukey Method

Dependent Variable	**(I) Age**	**(J) Age**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**
Verbal Short-term Memory	Monastic	Primary	-2.089*	.567	.001
		High	-4.150*	.637	.000
	Primary	Monastic	2.089*	.567	.001
		High	-2.061*	.583	.001
	High	Monastic	4.150*	.637	.000
		Primary	2.061*	.583	.001
Reading Ability	Monastic	Primary	-3.151*	.554	.000
		High	-4.469*	.622	.000
	Primary	Monastic	3.151*	.554	.000
		High	-1.318*	.569	.055
	High	Monastic	4.469*	.622	.000
		Primary	1.318*	.569	.055

4. The Relationships between Primary Students' Verbal Short-Term Memory and Reading Ability

The Pearson Product-Moment Correlation Coefficient was used to find the correlation between verbal short-term memory and reading ability (see Table 6).

Table 6: The Relationships between Students' Verbal Short-Term Memory and Reading Ability for Each Subscale

Subscales	1	2	3	4	5	6
Memory for Sentences	1					
Memory for Digits Forward	.502**					
Memory for Digits Backward	.485**	.442**				
Memory for Objects	.580**	.372**	.398**			
Reading Ability (Myanmar)	.582**	.380**	.417**	.505**		
Reading Ability (English)	.506**	.295**	.373**	.384**	.475**	1

**Correlation is significant at the 0.01 level (2-tailed)

As shown in the above table, the four subscales of verbal short-term memory were strongly and significantly correlated with their reading ability in Myanmar and English.

However, correlations do not indicate prediction of one variable from another variable. So, stepwise regression analysis was conducted.

Table 7: Multiple Regression Analysis Predicting Students' Reading Ability (RA) from Memory for Sentences, Memory for Objects and Memory for Digits Backward

Model	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
	B	Std. Error	Beta		
(Constant)	1.783	.663		2.691	.007
Memory for Sentences (MS)	1.208	.113	.434	10.721	.000
Memory for Objects (MO)	.612	.113	.209	5.425	.000
Memory for Digits backward (MDB)	.502	.108	.168	4.670	.000

a. Dependent Variable: Reading Ability

$$RA = 1.783 + 1.208\ MS + 0.612\ MO + 0.502\ MDB$$

This finding revealed that the primary students' reading ability was dependent on memory for sentences (MS), memory for objects (MO) and memory for digits backward (MDB) is shown in Figure 1.

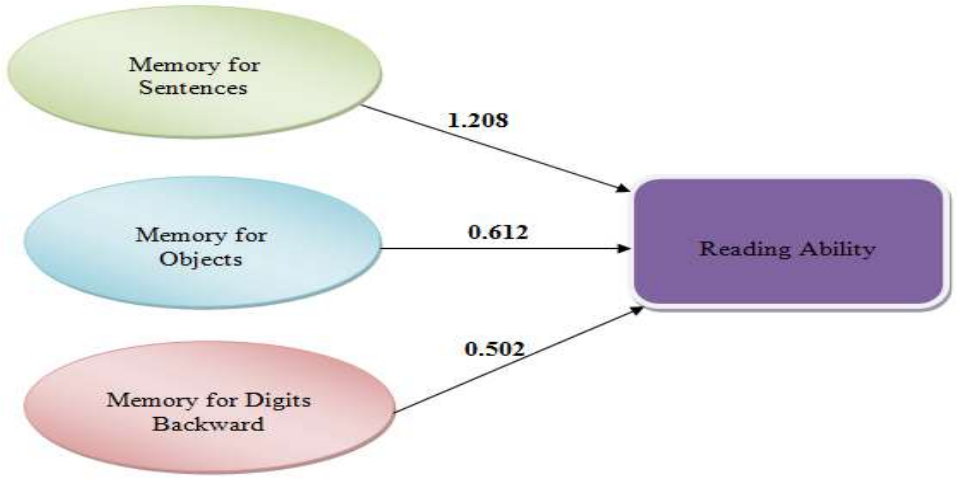

Figure 1: Model for Predicting the Effect of Verbal Short-Term Memory on Students' Reading Ability

Conclusion, Discussion and Suggestions

The primary students had high verbal short-term memory and they also had good reading ability. Then, Grade 5 students had higher verbal short-term memory than Grade 3 students and Grade 5 students had also higher reading ability in two subjects than Grade 3 students.

The primary students from high schools had the highest verbal short-term memory and reading ability when they compare with monastery and primary school students. That is why the differences of facilities, socio-economic status and geographic conditions.

Moreover, the primary students' verbal short-term memory was strongly correlated with their reading ability. This means that if primary students' verbal short-term memory was higher, their reading ability was higher. In addition, the students' verbal short-term memory was the good predictor for their reading ability.

Teachers should be actively supported students to improve their memory and to grow as readers. They should be encouraged to work together with students to adapt reading programs and they force students to read more. So that, children will become more develop their verbal short-term memory when they read more and more. And teachers should teach more practices and activities to improve students' memory such as memory games and puzzles. Then, teachers should encourage the students to read many books to get general knowledge and experience. Moreover, teachers should create many opportunities to get more knowledge and learning experience form school activities such as Essay Contests, Competitions of Poem, Art, Cartoons and Debates and so on.

It is also required to conduct the investigation of students' verbal short-term memory and reading ability depending upon their different ages, grades and schools. Moreover, the relationship between students' verbal short-term memory and other language skills, writing, listening and speaking ability should be investigated.

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Appendix A

Verbal Short-Term Memory Tests

Memory Tests for Sentences

1/ zwfjyoGm;aom pum;vkH;eSifhfudkufnDaom tajzudk a&G;cs,f yg/

1. This is a ------- of pine apple juice.

   (a) cup (b) tin (c) glass ………………

2. He ------- born in 2004.

   (a) is (b) was (c) has ………………

Memory Tests for Digits forward

2/ zwfjyoGm;aom udef;pOfrsm;eSifhfudkufnDaom tajzudk a&G;cs,f yg/

၁။ ၇-၉-၂

(က) ၇-၂-၉ (ခ) ၂-၉-၇ (ဂ) ၇-၉-၂ ………………

2/ ၅-၉-၄-၁

(က) ၅-၉-၁-၄ (ခ) ၅-၄-၁-၉ (ဂ) ၅-၉-၄-၁ ………………

Memory Tests for Digits backward

3/zwfjyoGm;aom udef;pOfrsm;eSifh ajymif;jyefjzpfaom tajzudk a&G;cs,f yg/

၁။ ၅-၄-၃

(က) ၅-၄-၃ (ခ) ၃-၄-၅ (ဂ) ၃-၅-၄ ………………

၂။ ၈-၇-၁

(က)၁-၈-၇ (ခ)၁-၇-၈ (ဂ)၈-၇-၁ ....

Appendix B

Reading ability Test

ay;xm;aom pmydk'fudkaocsmpGmzwfyg/ pmydk'fatmuf&Sd 0gusrsm;twGuf ay;xm;aom tajzrsm;rStajzrSefudka&G;jyD; tajzrSefa&Sh&Sd tu©&mudk OyrmwGif jyxm;onfhtwkdif; ○ jyD; ajzyg/

1. I am Khin Khin. My mother is Daw Aye. My father is U Mya. My mother is a teacher and my father is a farmer. I have two brothers and one sister. I am cooking with my mother and helping to my father.We are very happy at home.

Oyrm / I am -------.

A. Khin Khin B. Daw Aye C. U Mya

1. My ------- is Daw Aye.

   A. brother B. sister C. mother

2. My father is -------.

   A.U Myo B. U Myint C. U Mya

3. Daw Aye is a -------.

   A. nurse B. teacher C. doctor

4. I have ------- brothers.

   A. one B. two C. three

5. We are very happy at -------.

   A. school B. home C. zoo