



Chapter 4

Results

This chapter presented the relevant results of the present study. The results were presented consecutively in four groups of analysis (a) means of reading skills in reading method and directed behavior, (b) across treatment comparisons, (c) comparisons between the RR+SDB and RR+TDB groups, (d) post hoc comparisons for reading times and error detection mean scores in the RR+SDB, (e) generalization effects, and (f) intercorrelation among reading time, error detection, and comprehension.

Means of Reading Skills in Reading Method and Directed Behavior

Each participant was exposed to five common stories and completed three measures of reading skills. Means on reading times, errors detected, and comprehension scores were shown by crossbreaks of two variables in Tables 7, 8, and 9 respectively. One of which was reading method with two subclasses: repeated, and non-repeated reading. Another one was directed behavior which also had two subclasses: self-directed and teacher-directed behavior. Analyses of variance for each reading skill were shown in Table 10.

Table 7

Mean Reading Times in Repeated and Non-Repeated Reading With Self-Directed and Teacher-Directed Behavior (n = 7)

Directed Behavior	Reading Method		
	Repeated	Non-Repeated	
Self-Directed	253.23	319.37	286.30
Teacher-Directed	308.46	318.23	313.35
	280.85	318.80	

Note. Marginal means were added to the table; they were calculated from the cell means. The smaller the score is, the faster the speed.

As the Table 7 showed, the marginal mean of repeated reading showed less reading time (seconds) than non-repeated reading (280.85 : 318.80). Similarly, the marginal means also showed less reading time in self-directed behavior than those in teacher-directed behavior (286.30 : 313.35).

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table 8**Mean Errors Detected in Repeated and Non-Repeated Reading With Self-Directed and Teacher-Directed Behavior (n = 7)**

Directed Behavior	Reading Method		
	Repeated	Non-Repeated	
Self-Directed	11.20	9.71	10.55
Teacher-Directed	11.59	8.54	10.07
	11.40	9.13	

Note. Marginal means were added to the table; they were calculated from the cell mean. Range of score is 0 - 20.

As Table 8 indicated, the marginal means for errors detected (words) in repeated reading showed more increase than in non-repeated reading (10.40 : 9.13). The number of errors detected in self-directed and teacher-directed variables were slightly different (10.55 : 10.07).

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table 9**Mean Comprehension Scores in Repeated and Non-Repeated Reading With Self-Directed and Teacher-Directed Behavior (n = 7)**

Directed Behavior	Reading Method		
	Repeated	Non-Repeated	
Self-Directed	2.60	2.34	2.47
Teacher-Directed	2.69	2.20	2.45
	2.65	2.27	

Note. Marginal means were added to the table; they were calculated from the cell means. Range of score is 0 - 5.

As Table 9 illustrated, repeated reading showed slightly higher comprehension scores than non-repeated reading (2.65 : 2.27). In addition, the comprehension scores in self-directed and teacher-directed behavior were approximately equal (2.47 : 2.45).

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Across Treatment Comparisons

Table 10

Analyses of Variance for Reading Time, Errors Detection, and Comprehension.

Source	df	F		
		Reading Time	Error Detection	Comprehension
Reading Method (A)	1	5.285*	5.090*	1.570
Directed behavior (B)	1	2.683	.160	.009
A x B	1	2.914	.595	.149
Residual	24	(1908.273)	(7.007)	(.165)

Note. Values enclosed in parentheses represent mean square errors.

Reading Method = repeated reading, non-repeated reading.

Directed behavior = self-directed behavior, teacher-directed behavior.

* $p < .05$.

As shown in Table 10, there was no interaction between reading method and directed behavior either in reading time, $F_{(1,24)} = 2.914$, $p = .101$, errors detected, $F_{(1,24)} = .595$, $p = .448$, or comprehension, $F_{(1,24)} = .149$, $p = .703$. The main effect of reading method was reliable in both reading times, $F_{(1,24)} = 5.285^*$, $p < .05$, and errors detected, $F_{(1,24)} = 5.09^*$, $p < .05$. These findings indicated that there were significant differences between repeated and non-repeated reading in these variables. This meant repeated reading was more effective than non-repeated reading in reading time and error detection (see marginal means in Tables 7, 8). For comprehension, there was no significant difference between repeated and non-repeated reading (see Table 9).

Comparisons between the RR+SDB and RR+TDB group

The students' scores from the five same-story sets were computed for the same version in the RR+SDB and the RR+TDB groups (e.g. version 1). Means and standard deviations on reading times, errors detected, and comprehension scores for each of the 4 versions were presented in Table 11. The students' scores were subjected to 2 x 4 repeated-measure analyses of variances. In these analyses, group (RR+SDB, RR+TDB) was a between-subject factor, and repetition (4 repetitions) was a within-subject factor. The results of the analyses were shown in Table 12.

Table 11

Means of Reading Skills for the RR+SDB and RR+TDB Group (n = 7)

Repetition	Reading Time		Error Detection		Comprehension	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
<u>RR+SDB</u>						
Version 1	283.46	56.00	7.97	2.33	2.31	0.56
Version 2	281.89	49.50	9.20	3.39	2.54	0.63
Version 3	272.83	50.48	11.06	3.52	2.40	0.53
Version 4	253.23	46.18	11.20	2.54	2.60	0.59
<u>RR+TDB</u>						
Version 1	374.29	54.78	8.31	2.83	2.43	0.71
Version 2	339.77	47.51	9.51	2.65	2.46	0.49
Version 3	329.66	40.97	11.69	3.99	2.20	0.76
Version 4	308.46	36.89	11.57	3.54	2.69	0.64

Note. Version 1, 2, 3, and 4 = the first, second, third, and fourth reading, respectively

As shown in Table 11, the reading times between the RR+SDB and the RR+TDB were relatively different. The subsequent repetition tended to decrease from the previous one. It was to be noted that the more the number of repetition, the less the reading time became.

Errors detected and comprehension scores were similarly generated in both groups. For errors detected, the RR+SDB and the RR+TDB groups obtained lower scores in the first and second versions and higher scores in the third and fourth versions. For comprehension, both groups obtained similar scores and variations.

Table 12

Repeated Measure Analyses of Variance for the RR+SDB and RR+TDB group

Source	df	F		
		Reading Times	Error Detection	Comprehension.
<u>Between subjects</u>				
Group (A)	1	6.85*	.07	343.92
Within cells	12	(8680.08)	(34.84)	(0.98)
<u>Within subjects</u>				
Repetition (B)	3	27.89*	22.57*	1.74
A x B	3	5.11*	.05	.42
Within cells	36	(200.88)	(1.58)	(0.18)

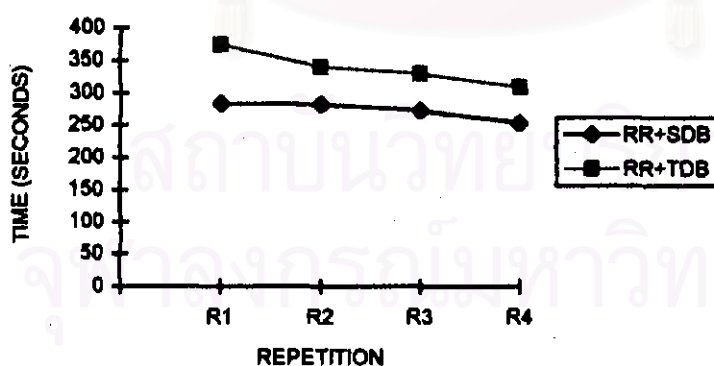
Note. Values enclosed in the parentheses represented mean square errors.

* $p < .05$.

For reading times, there were main effects of group, $F_{(1,12)} = 6.85^*$, $p < .05$, and repetitions, $F_{(3,36)} = 27.89^*$, $p < .05$, that were qualified by their interaction, $F_{(3,36)} = 5.11^*$, $p < .05$. The simple-effects means were tests to examine whether there were differences between the RR+SDB and the RR+TDB at each repetition, and among repetitions at each group. The results showed that there were significant differences between the RR+SDB and the RR+TDB groups at each repetition, $F_{s(1,48)} = 12.44^*$, 5.05^* , 4.87^* , 4.60^* , at R1, R2, R3, and R4, respectively, all $ps < .05$ (see Appendix D for the simple-effect analyses). In addition, there were significant differences among repetitions in both RR+SDB and RR+TDB groups, $F_{s(3,36)} = 6.73^*$ and 26.28^* , $ps < .05$, at RR+SDB and RR+TDB, respectively. As shown in Figure 8, the RR+SDB group read faster (less time used) than the RR+TDB group in each repetition. The most differences between the two groups appeared at the first reading (R1).

Figure 8

Mean Reading Times for Four Repetitions Between the RR+SDB and the RR+TDB groups



For errors detected, the main effect was only found in the repetition factor, $F_{(3,36)} = 22.57^*$, $p < .05$. This finding indicated the students' detection in the RR+SDB and the RR+TDB groups were similarly effected by repetition. For comprehension, there was no effect due to group and repetition or their interaction

(see Table 12), suggesting that the students' comprehension in the RR+SDB and the RR+TDB groups were not effected by the treatment.

Post Hoc Comparisons for Reading Times and Error Detection in the RR+SDB group

The post hoc comparisons for reading times and error detected mean scores in the RR+SDB group were further performed by using the range tests (Tukey's procedure). The results were shown in Tables 13, 14.

Table 13

Differences Between Mean Reading Times in the RR+SDB group

Repetition	R4	R3	R2	R1
	(253.23)	(272.83)	(281.89)	(283.46)
R4 (253.23)	--	19.6	28.66*	30.23*
R3 (272.83)		--	9.06	10.63
R2 (281.89)			--	1.57

Note. (1) $n = 7$. (2) Values enclosed in parentheses represent mean reading times that belong to those repetitions.

* $p < .05$

The outputs in Table 13 showed there were significant differences between mean reading times for the first and fourth, and second and fourth readings. The results indicated that the significant gain in reading times tended to emerge when the students were exposed to the fourth reading of the repeated stories.

Table 14**Differences Between Mean Error Detection in the RR+SDB group**

Repetition	R4	R3	R2	R1
	(11.20)	(11.06)	(9.20)	(7.97)
R4 (11.20)	--	0.14	2.00*	3.23*
R3 (11.06)		--	1.86*	3.09*
R2 (9.20)			--	1.23

Note. (1) $n = 7$. (2) Values enclosed in parentheses represent mean error detection that belong to those repetitions.

* $p < .05$

For errors detection, Table 14 showed that there were significant differences between the first and third, first and fourth, second and third, and second and fourth readings, but there were no significant differences between the first and second, and the third and fourth readings.

Generalization Effects

The generalizations of a reading skill were examined by graphically comparing between the first reading (Version 1) and the new stories reading. It was occurred when a student showed more improvement in the new stories than in the first reading.

The generalizations of reading skills in this section were presented in, (a) group comparisons (between repeated and non-repeated reading), and (b) a within group comparisons (repeated reading with self-directed behavior),

Group comparisons. Students' mean scores of version 1 and new stories of reading times, error detection, and comprehension were graphically compared between repeated and non-repeated reading as shown in Figures 9, 10, and 11.

Figure 9

Generalization of Reading Times for Repeated and Non-Repeated Reading

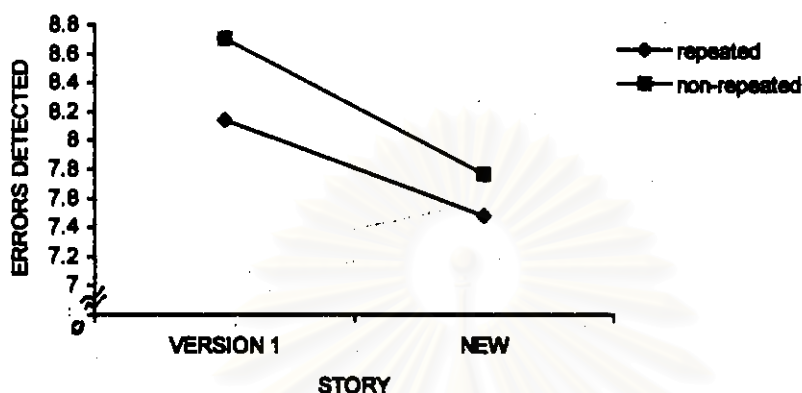


Note. version 1 = first versions of repeated or non-repeated stories; new = new stories.

As shown in Figure 9, the reading times in the new stories were consistently less than those in the first versions for both repeated and non-repeated reading indicating that some speed skill tended to generalize to the new stories by these reading methods. The less the reading time used for reading the new stories, the more generalized speed appears to be.

Figure 10

Generalization of Error Detection for the Repeated and Non-Repeated Reading

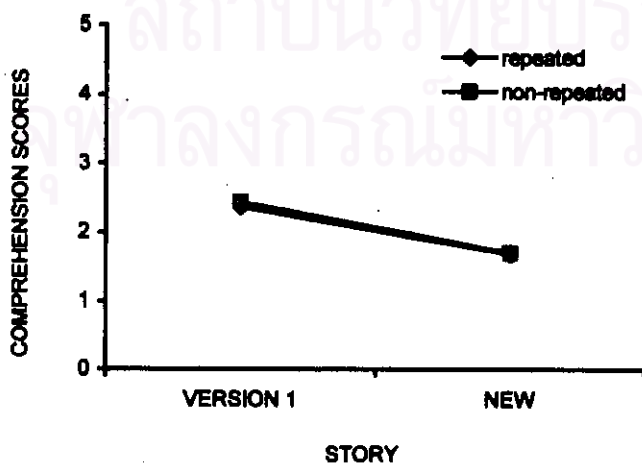


Note. Maximum score is 20.

In Figure 10, errors detected in the new stories were less than the first versions in either repeated or non-repeated reading indicating that there was no generalization of detection skill in the new stories. In contrast to reading times, the more errors detected in the new stories, the more apparent a generalization of this skill is present.

Figure 11

Generalization of Comprehension for the Repeated and Non-Repeated Reading



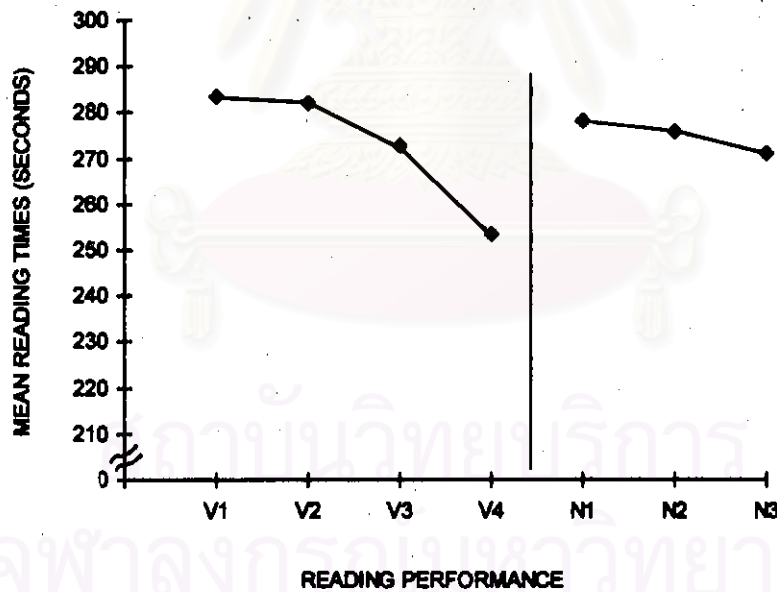
Note. Maximum score = 5.

Similarly in errors detected, the students obtained lower comprehension scores in reading the new stories than their scores in the first versions in both repeated and non-repeated reading. This indicates that no generalization of comprehension skill is present in reading.

Generalization within group comparisons. The generalizations of reading skills for the RR+SDB group were taken for graphical comparison. The generalizations of reading time, error detection, and comprehension were shown in Figures 12, 13, and 14, respectively.

Figure 12

Generalization of Reading Time for the RR+SDB Group.

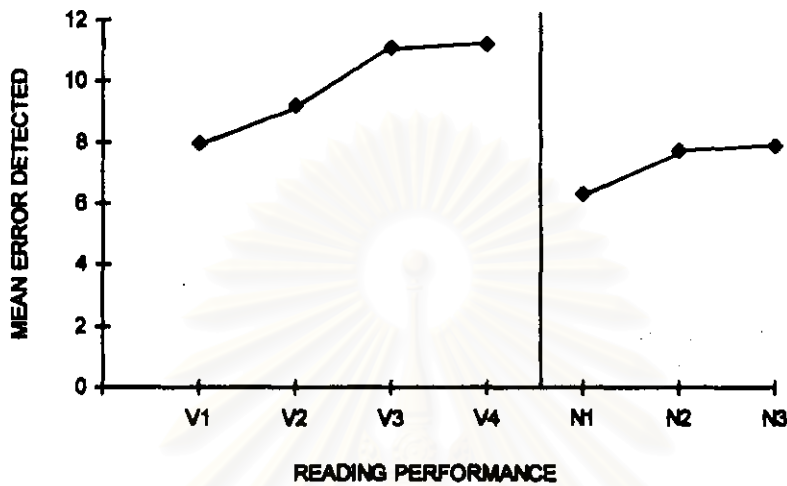


Note. V1, V2, V3, V4 = Version 1, 2, 3, and 4;

N1, N2, N3 = new story 1, 2, and 3.

As shown in Figure 12, the reading times in the new stories were less than the first version reading of the repeated stories. The data indicated that there was some generalization of reading times (speed) to the new stories.

Figure 13

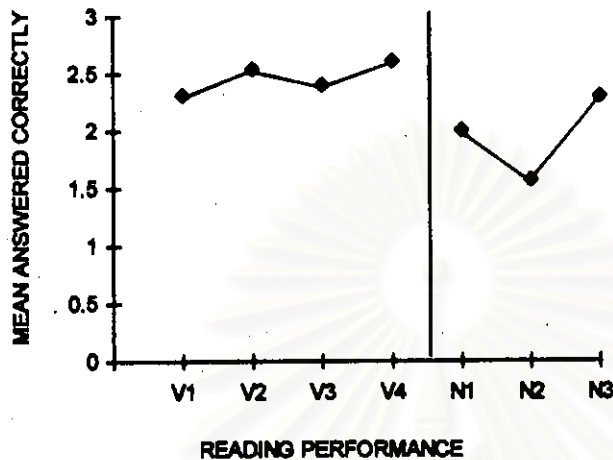
Generalization of Error Detection for the RR+SDB Group.

Note. V1, V2, V3, V4 = Version 1, 2, 3, and 4;

N1, N2, N3 = new story 1, 2, and 3.

As shown in Figure 13, the ability to detect errors in the new stories was not better than the ability to detect errors in the first versions of the repeated reading. That indicated there was no generalization of this skill from repeated stories to the new story readings. However, it was shown that the improvement of errors detected was a story-specific effect. That is while reading the fourth version of repeated stories, the students were better in detecting errors than while reading the new stories.

จุฬาลงกรณ์มหาวิทยาลัย

Figure 14**Generalization of Comprehension in the RR+SDB Group.**

Note. V1, V2, V3, V4 = Version 1, 2, 3, and 4;

N1, N2, N3 = new story 1, 2, and 3.

For comprehension, the scores in the new stories were not more than the first versions or repeated stories; indicating there was no generalization of this skill to the new stories.

Relationship of Reading Time, Error Detection, and Comprehension.

To explore how improvement reading skills is related to other factors in this study, correlations were computed between reading time, error detection, and comprehension. The correlations between these factors were computed in three groups: (a) repeated reading, (b) self-directed behavior, and (c) repeated reading with self-directed behavior. The data were the average scores of reading time, error detection, and comprehension of the common stories (version 4) and the generalized stories. The results of these correlations were presented in Table 15.

Table 15

Intercorrelation Among Reading Time, Error Detection, and Comprehension for the RR, SDB, and RR+SDB group

Subscale	1	2	3
<u>Repeated Reading (RR) (n = 14)</u>			
1. Reading Time	--	.17	-.19
2. Error Detection		--	.25
3. Comprehension			--
<u>Self-Directed Behavior (SDB) (n = 14)</u>			
1. Reading Time	--	.08	-.56*
2. Error Detection		--	-.17
3. Comprehension			--
<u>Repeated Reading With Self-Directed Behavior (RR+SDB) (n = 7)</u>			
1. Reading Time	--	.36	-.57
2. Error Detection		--	-.68*
3. Comprehension			--

Note. * $p < .05$.

At repeated reading, reading time had a low, positive correlation with error detection ($r = .17$) indicating that a slow speed was associated with a low level of detection. Reading time was related negatively to comprehension ($r = -.19$), indicating that, as speed increased, comprehension tended to decrease. Additionally, error detection was related positively to comprehension ($r = .25$) indicating that a low level of detection was associated with a low level of comprehension.

At self-directed behavior, reading time had a very low relationship with comprehension ($r = .08$). Comprehension showed a significant negative relationship with reading time ($r = -.56^*$), and a low negative relationship with error detection ($r = -.17$). An increase in reading time was associated with a decrease in comprehension; and an increase in error detection with a decrease in comprehension.

At self-directed behavior with self-directed group, comprehension was negatively related strongly to error detection and comprehension ($r = -.68^*$ and $r = -.57$, respectively) indicating that, as speed and error detection increased, comprehension decreased. Additionally, reading time and error detection were moderately positive in relationship ($r = .36$).

In conclusion; first, repeated reading was significantly better than non-repeated reading on reading times (speed) and error detection skills. Second, repeated reading with self-directed behavior showed significantly more improvement in reading times than teacher-directed behavior. Third, self-directed and teacher-directed behavior were not different in reading times, error detection and comprehension. Fourth, there were some improvement in reading times and error detection across four repetitions for the repeated reading with self-directed group. Fifth, reading times tended to generalize similarly from repeated stories to the new stories in the repeated and non-repeated groups. Finally, reading time, error detection, and comprehension showed relationships to some extent.

This study suggested that repeated reading especially repeated reading with self-directed behavior was an effective method to increase the poor third-grade hilltribe students' reading speed and detection skills. In addition, the students were able to direct themselves to achieve their reading goals equally or better than with teacher assistance.