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How the Amount of Time Spent on Independent Reading Affects Reading Achievement:

A Response to the National Reading Panel

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Abstract

Although there is correlational evidence showing that students who read more have higher achievement, the National Reading Panel stated there was no experimental study showing practice effects of how time spent reading affects achievement. To provide experimental evidence that more time spent reading produces higher achievement, this study was addressed to test the effects of allowing more versus less time for independent reading for students who differed in reading ability. The design was a 2 (Time) \times 2 (Grade) \times 2 (reading level) factorial. The participants were grades 3 and 5. This quasi-experimental design was used to test how time spent in independent reading affects reading achievement. In this study, all students read books matched to their reading ability, and after reading a book took a quiz that provided immediate feedback. The control group spent 15 minutes per day reading books and the experimental group spent 40 minutes per day reading books. This study lasted six months. With the exception of the time spent in independent reading, all other factors such as quality of the teachers and type of reading program were the same. Pretest and posttest data were collected from all students in this study. Data analysis found that more time spent reading had a significant effect on achievement compared to a control condition where less time was allocated for independent reading. In addition, results found that poor readers showed significantly greater gain in word recognition and vocabulary than good readers. Third grade showed greater gain in comprehension than fifth grade. Furthermore, the results also showed that poor readers tended to have greater gains in vocabulary with 15 minutes of reading, but they had better gains on reading comprehension with 40 minutes of reading.

How the Amount of Time Spent on Independent Reading Affects Reading Achievement:
A Response to the National Reading Panel

While most educators believe that students who read more are better readers; the National Reading Panel (NRP) report questioned this assumption. Their summary report states,

“With regard to the efficacy of having students engaged in independent silent reading with minimal guidance or feedback, the Panel was unable to find a positive relationship between programs and instruction that encourage large amounts of independent reading and improvements in reading achievement, including fluency. In other words, even though encouraging students to read more is intuitively appealing, there is still not sufficient research evidence obtained from studies of high methodological quality to support the idea that such efforts reliably increase how much read or that such programs result in improved reading skills. Given the extensive use of these techniques, it is important that such research be conducted. (p. 13 Report of the National Reading Panel, Summary Report, December, 2000)”

Specifically, the Panel was calling for experimental studies in which one could determine cause and effect to settle the question as to whether time spent in independent reading resulted in reading achievement gains. Marrietta Castle (2002) pointed out, that “from the experimental evidence the Panel could neither confirm nor deny the possibility that programs that increase the amount of independent reading will also increase reading achievement (p.243).” What is needed to solve the dilemma is experimental studies showing cause and effect.

NRP’s report consisted of 14 studies and analyzed these studies using meta-analysis. It concluded that it is hard to find clear evidence to support the idea that reading more benefits student’s reading achievement. Following the NRP’s report, Marta Lewis

(2001) completed a doctoral dissertation using meta-analytical procedures to explore the relationship between reading time and reading outcomes. She found a moderately strong, positive, relationship between reading exposure and reading outcomes. In addition, she used a separate analysis of d-index effect sizes from experimental studies that provided clear causal evidence showing that students who have in-school independent reading time in addition to regular reading instruction, do significantly better on measures of reading achievement compared to students who were not provided time for independent reading. Because the NRP's report and Mata Lewis' analysis came to different conclusions, further studies are needed to investigate how the amount of time spent on reading affects students reading achievement.

From the perspective of educational pedagogy, the issue regarding the relationship between the amount of time spent reading and reading achievement is important for reading instruction because of the pervasive belief among educators that practice improves reading skills. Furthermore, models of learning stress time-on-task, as an important factor in what and how much is learned, and they posit a linear relationship between practice time and learning, at least up to some asymptotic amount of time. Thus, from the theoretical perspective, Carroll's models of school learning and time suggested that "a learner will succeed in learning a given task to the extent that he spends the amount of time that he needs to learn the task" (1963, p. 725). Therefore, the main purpose of this study was to investigate whether more time spent reading leads to improved reading achievement.

Related Research

Taylor, Frye, and Maruyuma (1990) found high correlations between the amount of independent reading time and student's reading achievement scores. Using a very different approach, Stanovich, West, Cunningham, Cipelewski, and Siddiqui (1996) found that students who had low scores on the Author Recognition Questionnaire also tended to have lower comprehension scores. Conversely, students who had higher recognition scores also showed a higher level of comprehension performance. The implication is that if students read a lot, their reading comprehension performance is better. Also, Anderson, Willson, and Fielding (1988) found that, for second graders, the number of books that students read is the best predictor for reading comprehension, vocabulary, and reading speed.

These correlational studies showed clearly that amount of reading that a student had engaged in was a good predictor of reading performance, but they all suffered from the same problem, namely that one cannot determine cause and effect. Correlational studies are difficult to interpret because the directionality can go both ways. It is entirely possible that good readers read more because they enjoy it, so they read more. One could argue that it was not the amount of reading that made them good readers, but they started out with this advantage. That is, the amount of reading has little to do with making one into a good reader. Krashen (2002) also indicated that several correlational studies control for prior reading ability and they provide strong evidence that recreational reading is a cause of literacy development.

One experimental study came to light which tested the effects of adding additional independent reading time to the reading program (Peters, 1999). Peter's doctoral dissertation study failed to find significant differences between the experimental

treatment group that received extra reading time and control groups which did not. What is not clear in this report is how long the study was conducted and it is possible that this study was of short of duration that the finding represented a type II experimental error.

In the literature, some non-experimental studies showed a positive relationship between time spent reading and reading achievement. For example, Cardinale (1989) found that student's time-on-task and academic achievement were positively correlated. Also, Dr. Cathy Watkins (n.d.) in her article *Why Fluency Matters* stated:

““It should not be surprising that students who lack reading fluency find it difficult to stay on task when asked to engage in extended-reading activities, such as sustained silent reading.”

The purpose of the present study was to test the effects of allowing more versus less time for independent reading for students who differed in reading ability. Specifically, we examined the effect of how different amounts of time spent on reading might influence reading outcomes, such as vocabulary, comprehension, and reading speed. In addition, we wanted to know whether the effect of time spent on reading was affected by reading ability. Finally, we wanted to know whether the effect of time spent on reading differed by grade level.

Method

Design

The research design contained three factors. The first factor was treatment, the second factor was grade level, and the third factor was reading ability. This study used a 2 (15-minute vs. 40-minute) \times 2 (grade 3 vs. grade 5) \times 2 (below grade level vs. above grade level) quasi-experimental design to estimate how the amount of the time spent reading affects reading achievement. Student reading ability was divided into two

categories, below or above grade level, based on student scores on the *Standardized Test of Assessment of Reading*® (STAR Reading) test.

In this study the students were not randomly assigned to treatment condition (15 minutes vs. 40 minutes) by the researchers because the teachers had distributed students to classrooms with the goal of having achievement balance in all the classrooms. The goal of the teachers in distributing students was to have each classroom with similar levels of reading achievement. What the researchers did was to randomly assign conditions to classrooms. Each treatment condition had two classrooms. All four teachers in this study were experienced, averaging 22.5 years of experience. The least experienced had ten years of service and the most experienced had 29 years.

Participants

Seventy-two students participated in this study. Thirty-five students were assigned to the 15-minute condition and 37 students were assigned to the 40-minute condition. The number of participants for each cell is shown in Table 1 and the marginal information is shown in Table 2. This study was conducted in a k-6 St. Paul, Minnesota elementary school with 532 students. Sixty-four percent of the students at this school received free or reduced priced lunch compared to the state average of 28%. Ethnicity of the school consisted of 43% White, 33% Asian (Hmong), 15% African-American, and 9% Hispanic. All the third and fifth graders enrolled in Minnesota public schools take the Minnesota Comprehensive Assessment (MCA) examination in reading to determine achievement. Comparing reading achievement in the school where this study was done to the rest of the state, the results of MCA reading showed that the students in the school

lagged considerably behind the rest of the state, and that the poverty level, as indicated by the number of free lunches, is considerably higher than the rest of the state.

Materials

The Standardized Test of Assessment of Reading® (STAR Reading). Students were pre- and post-tested on the STAR Reading Test (Renaissance Learning Inc., 1999). This is an individually administered, nationally normed computer-adaptive assessment of a student's level of reading achievement that takes about ten minutes to complete. For purposes of the research, the STAR Reading test provided an objective measure of each student's reading ability and reading level for the reading materials. The split-half reliability of the STAR Reading ranged from .89 to .93. The test-retest reliability of the STAR Reading ranged from .79 to .94.

Curriculum Based Measurement (CBM). CBM task was used as an index to determine the subject's reading speed. Participants read a text for one minute and a correct word per minute rate (WPM) was calculated. The reading passages for measuring CBM were selected from *Standard Reading Passages* (Children Educational Service, 1987). The grade level readability of the CBM passages students read matched the student's reading ability. For example, a student whose reading ability level was grade three which was determined by the STAR reading test read from passages that had a third grade readability. Each student read three different passages to collect the CBM information. The average of WPM from these three passages was used as the CBM score. To avoid the memory recall from reading the same passage again and again, three new passages were used by the end of the study. These three new passages were called

transfer passages which had same readability level and text difficulty as the three passages that we used during the study.

Accelerated Reader Program®. The Accelerated Reader program® (Renaissance Learning Inc., 2000) was used for both 15-minute and 40-minute groups to provide the immediate feedback after students finished reading a book for independent reading. In this program, after a student has finished reading a library book the student took a short quiz on a computer that evaluated how well the student comprehended the book. As soon as the test was completed, the computer provided the score on the comprehension test in percentage and provided the student with the option of getting the correct answer for each question that the student missed.

Metropolitan Achievement Test (7th edition) (The Psychological Corporation, 1993). The seventh edition (MAT-7) is a norm-referenced series of tests designed to provide achievement data on students in grades K-12. In this study, we used the vocabulary and reading comprehension subtests to collect student reading ability.

Woodcock Reading Mastery Test-Revised (Woodcock, 1987). We used the word identification subtest to collect student word recognition ability. The participants' score was determined by the number of words correctly read. The split-half reliability correlation is .97.

Procedure

This study lasted for six months. All students in this study had three reading blocks—one block had 60minutes, second block had 15 minutes, and the last block had 40 minutes—so that all the students in the study had the same amount of time devoted to reading. What was done during each block is listed below.

First block (60 minutes). During the first 60 minutes block, teachers in the 15-minute and 40-minute groups conducted what may be termed a balanced reading program (Pressley, 1998), where the students were given explicit instruction in word recognition and comprehension skills combined with reading or listening to authentic texts.

Second block (15 minutes). For the next 15-minute block, teachers in the 15-minute and 40-minute groups conducted what is termed a “Reading To” program. Each day the teacher read good literature to the whole class while the students listened. Discussions were held on various aspects of the book such as its plot, characterization, and emotional reactions of the characters to events in the story.

Third block (40 minutes). During the final 40-minute block, the teachers in both 15-minute and 40-minute conditions conducted an “Independent Silent Reading” (ISR) program. In both conditions, students read selected color-coded books from the library that matched their reading level. The only difference between the two conditions was that the students in the 15-minute condition after completing 15-minute independent silent reading, they listened to the teacher read a book to them for 25 minutes, and the students in 40-minute group did the independent silent reading for 40 minutes. Both groups when completing a book took a computer quiz to test how well they did on reading comprehension.

The MAT-7 reading achievement tests and Woodcock-Johnson word recognition test were administered to both the 15-minute and 40-minute groups in the beginning of this study as pre-test measures, and at the end of this study as post-test measures of achievement. In addition, the STAR reading and the CBM tests were administered to both the 15-minute and 40-minute groups in the beginning of this study (Fall) as pre-test

measures, and at the middle of the study (Winter) as post-test measures of achievement. The CBM transfer passages were administrated by the end of the study.

Results

Design and Analysis

A 2 (Time) \times 2 (Grade) \times 2 (Reading level) factorial design was used in this study. Because significant differences were found on pretest scores between the 15-minute and 40-minute groups, we used gain scores from pretest to posttest as the unit of analysis. These gain scores were analyzed using a multivariate analysis of variance (MANOVA).

Descriptive Statistics

Table 1 presents the means and standard deviations of the data from the gain scores taken from the seven dependent measures (STAR gain score between fall and winter, STAR gain score between fall and spring, CBM word per minute gain score between fall and winter, CBM word pre minute gain score between fall and spring, CBM transfer passage in word per minute, MAT vocabulary, MAT gain score on reading scale score, and Woodcock Johnson word recognition gain score) by treatment group, grade, and the reading ability. The MANOVA was used to determine if there were significant differences between conditions, grades, and reading abilities¹.

Overall Analyses

A MANOVA was used to test simultaneously the effects of the independent variables (treatment, group, and reading ability) on the gain scores of seven dependent

¹ The information presented in Tables 1 and 2 used below and at or above grade level to present the reading ability, but we used low ability group as below the grade level and high ability group as at or above grade level in the result section to present the result.

measures. The results showed one significant interaction between treatment and reading ability and a significant main effect for grade level.

Interaction: Treatment by Reading Ability

A significant interaction effect between treatment and reading ability was found on four dependent measures: gain score on the STAR reading test from fall to winter ($F(1, 67) = 6.04, p < .05, \eta^2 = .08, MSE = 6337.78$), gain score on the MAT vocabulary ($F(1, 67) = 11.21, p < .01, \eta^2 = .14, MSE = 767.72$), gain score on the MAT reading scale score ($F(1, 67) = 4.52, p < .05, \eta^2 = .06, MSE = 431.55$) and gain score on the Woodcock-Johnson's word recognition test ($F(1, 67) = 6.92, p < .05, \eta^2 = .09, MSE = 30.71$). The mean and SD for each group by each dependent measure are presented in Table 2. To explore the difference between groups, the ANOVA was used to examine the simple effects on treatment and reading ability.

Simple effect—Treatment. For the group with below grade level reading ability, the ANOVA results showed no significant difference between 15-minute and 40-minute groups. However, for the group with above reading ability, the ANOVA results showed a significant difference between 15-minute and 40-minute groups on four dependent measures: gain score on the STAR reading test from fall to winter ($F(1, 25) = 19.89, p < .001, \eta^2 = .44, MSE = 5168.34$), gain score on the STAR reading test from fall to spring ($F(1, 25) = 6.07, p < .05, \eta^2 = .20, MSE = 9072.29$), gain score on the MAT vocabulary ($F(1, 25) = 5.53, p < .05, \eta^2 = .18, MSE = 791.79$), and gain score on the Woodcock-Johnson's word recognition test ($F(1, 25) = 5.55, p < .05, \eta^2 = .18, MSE = 35.49$). In terms of effect size, the time spent on reading could explain from 18% to 44% of the variation on these four dependent measures for the group with higher reading ability.

The means and standard deviations for each reading ability group on each dependent variable are listed in Table 2. According to the descriptive statistics in Table 2 and the F-tests mentioned above, on the STAR reading test from fall to winter, the 40-minute group ($M = 141.60$, $SD = 79.27$) had a significantly higher gain score than 15-minute group ($M = 17.42$, $SD = 61.23$); on the STAR reading test from fall to spring, the 40-minute group ($M = 184.80$, $SD = 87.25$) had a significantly higher gain score than 15-minute group ($M = 93.92$, $SD = 104.55$); and on the MAT vocabulary the 40-minute group ($M = 31.53$, $SD = 27.09$) had a significantly higher gain score than 15-minute group ($M = 5.92$, $SD = 29.41$). However, on the Woodcock- Johnson's word recognition test, the 15-minute group ($M = 5.83$, $SD = 4.22$) had a significantly higher gain score than 40-minute group ($M = .40$, $SD = 7.03$).

Simple effect—reading ability. The ANOVA results for the 15-minute group showed a significant difference between the group with below grade level reading ability and the group with above grade level reading ability on two dependent measures: score on the CBM transfer passage ($F(1, 33) = 7.14$, $p < .05$, $\eta^2 = .18$, $MSE = 1481.57$) and gain score on the MAT vocabulary ($F(1, 33) = 7.29$, $p < .05$, $\eta^2 = .18$, $MSE = 813.88$). According to the descriptive statistics and the F-tests mentioned above, on the CBM speed of reading transfer passage, the high ability group ($M = 152.83$, $SD = 38.67$) had a significantly higher score than low ability group ($M = 116.20$, $SD = 38.40$). On the MAT vocabulary, however, the low ability group ($M = 33.35$, $SD = 28.08$) had a significantly higher gain score than high ability group ($M = 5.92$, $SD = 29.41$). In terms of effect size, the reading ability could explain 18% of the variance on the CBM speed of reading transfer passage and the MAT vocabulary for the 15-minute group.

The ANOVA results for the 40-minute group showed a significant difference between the group with below grade level reading ability and the group with above grade level reading ability on four dependent measures: gain score on the STAR reading test from fall to spring ($F(1, 34) = 8.45, p < .01, \eta^2 = .19, MSE = 6404.52$), score on the CBM reading speed transfer passage ($F(1, 34) = 17.88, p < .001, \eta^2 = .34, MSE = 969.41$), gain score on the MAT reading scale score ($F(1, 34) = 6.08, p < .05, \eta^2 = .15, MSE = 287.87$), gain score on the and gain score on the Woodcock- Johnson's word recognition test ($F(1, 34) = 15.34, p < .001, \eta^2 = .31, MSE = 34.38$). The means and standard deviations for each reading ability group on each dependent variable are listed in Table 2. According to the descriptive statistics listed in Table 2 and the F-tests mentioned above, on the STAR reading test, the high ability group ($M = 184.80, SD = 87.25$) had a significantly higher gain score than low ability group ($M = 106.91, SD = 74.83$); on the CBM reading speed transfer passage, the high ability group ($M = 158.78, SD = 27.53$) had a significantly higher score than low ability group ($M = 114.70, SD = 33.32$); and on the MAT reading scale score, the high ability group ($M = 32.73, SD = 19.26$) had a significantly higher gain score than low ability group ($M = 18.73, SD = 15.24$). However, on the Woodcock- Johnson's word recognition test, the low ability group ($M = 8.09, SD = 4.94$) had a significantly higher gain score than high ability group ($M = .40, SD = 7.03$).

Main Effect—Grade Level

Furthermore, a significant main effect for grade level was found on two dependent measures: gain score on the CBM word per minute rate from winter to fall ($F(1, 67) = 10.85, p < .01, \eta^2 = .14, MSE = 248.95$) and score on the CBM speed of reading

transfer passage ($F(1, 67) = 27.77, p < .001, \eta^2 = .29, MSE = 873.97$). The means and standard deviations for each reading ability group on each dependent variable are listed in Table 2. The third grade ($M = 30.01, SD = 16.74$) had a significantly higher mean gain score on CBM word pre minute from winter to fall than did the fifth grade ($M = 16.94, SD = 14.84$). On the CBM speed of reading transfer passage, the fifth grade ($M = 149.89, SD = 33.59$) had a significantly higher mean score than did the third grade ($M = 109.29, SD = 34.68$).

Discussion

While one might assume that there is universal agreement among educators that up to some upper limit the amount of time spent in study and in practice has a positive outcome on student achievement, the National Reading Panel statement regarding the lack of experimental evidence to support this assumption was the cause of considerable concern among educators, especially since there is growing demand that educational decisions should be based on research evidence. For example, a decision by a school to increase the amount of time students spend doing independent reading could be called into question because there is no experimental evidence to support this curriculum decision. Hence, one of the major reasons for this study was to test experimentally the hypothesis that more time spent reading leads to increases in achievement. This experimental study investigated several questions that relate to time spent reading, reading ability, and grade level. First, we examined the effect of how different amounts of time spent reading might influence reading outcomes. Second, we wanted to know whether the effect of time spent reading was influenced by the student's reading ability.

Finally, we wanted to know whether the effect of the amount of time spent reading differed by grade level.

We do not have a simple answer regarding to the question of how the amount of time spent on reading affects reading achievement because we failed to found a main effect for time (i.e. 15 minutes vs. 40minutes). However, we did find a significant interaction between reading ability and time spent reading. This interaction can be interpreted in the following way. That is, students with different reading ability have different reading achievement patterns as a function of the amount of time they spent reading independently. Because there was an interaction between reading ability and time spent reading, we examined the simple effects on time spent reading and reading ability separately. We also found a significant main effect for grade level.

With regard to the simple effect of treatment (time spend reading), the results showed that no difference was found between 40-minute and 15-minute groups for the groups with below the reading ability level. However, for the higher reading ability group we found that the amount of time spent reading had an important influence on several reading outcomes. For example, in the higher ability reading group, the students received 40 minutes of independent reading showed significantly greater gain scores than 15 minutes groups on the STAR reading test and MAT vocabulary. However, the 15-minute group had a significantly higher gain scores than the 40-minute group on the Woodcock-Johnson's word recognition test.

One might speculate why the differences in the amount of time spent reading had a positive affect for the higher ability student but not for the lower ability students. It is possible that for the lower ability students, even though the books they read were

appropriate for their reading ability, independent reading was sufficiently difficult that it affected their attention span. In essence, for the low ability students, 15 minutes of independent reading was appropriate for them, whereas the 40-minute time slot was too long. Consequently, the added reading time did not do any good for students with low reading ability. In support this explanation as to why the 15-minute time slot is more advantageous, Felmlee and Eder's (1983) study found that students who were in a low-ability group had a short attention span. Also, there is evidence that students who have lower achievement ability cannot maintain attention for as long as their peers who have higher achievement (Soli & Devine, 1976). Thus, for this study, 15-minutes may have been the limit of low ability students' attention span. In conclusion, one might say that more is not necessary better for this particular group.

With regard to the simple effect of reading ability, the results showed that for the 15-minute group significant differences were found between low and high reading ability groups on the CBM transfer passage as well as the MAT vocabulary. The low ability group gained significantly more than the high ability groups on both measurements. In addition, for the 40-minute group, the result showed that significant differences were found between low and high reading ability groups on four measures, these consisting of the STAR reading test, the CBM transfer passage, MAT reading scale score, and the Woodcock Johnson's word recognition test. Whereas the higher ability group had significantly higher gain scores on the STAR reading test, the CBM transfer passage, and the MAT reading scale score, the low ability group gained significantly more than higher ability group on the Woodcock Johnson's word recognition test.

One possible explanation for the simple effect on reading ability might be that for the low ability group spending 15 minutes on independent silent reading has a better impact on their reading than spending 40 minutes for skills, such as reading speed and reading comprehension. However, when it comes to improving the word recognition skill for these low ability students, spending more time on independent reading has a better impact than less time. Conversely, for the high ability students in this study spending more time on reading leads to greater gains on their general reading achievement than spending less time.

To answer the last question about whether the effect of the amount of time spent reading differed by grade level, we found there was no interaction between grade level and time spent reading. However, different grade levels showed different strengths on different measurements. For example, the third grade had a significantly higher gain score than fifth grade on the CBM speed of reading passage (same passage) from fall to winter; however, the fifth grade had a significantly higher gain score on the CBM speed of reading transfer passage (different passage).

One possible explanation is that the younger students have limited vocabulary knowledge, so they do better on reading speed when they repeatedly read the same passage. Therefore, for the younger students over practice is a very important factor to improve their reading ability. However, the older students, who have more extensive vocabulary than the younger students, do better on the transfer passages where new words appeared, but not on the same passage where no new words appeared. One possible explanation ask to why the older students did not gain significantly on the

original passage from pre- to post-test is that there is a ceiling effect on how much older students can improve their reading speed when they orally read the same passage.

There are several educational implications that may be derived from this study. First, the amount of time devoted to reading has a positive impact on reading achievement. Second, the amount of time assigned to independent reading should match students' reading ability. For the low reading ability groups, 15 minutes on independent silent reading appears to be more beneficial than 40 minutes for improving skills such as reading speed and comprehension. However, for improving their word recognition ability 40 minutes on independent silent reading seems more optimal than the shorter time period. For the high ability groups, in general, 40minutes on independent silent reading has the most beneficial effects across the variety of reading skills. Third, different grade levels showed different strength on different measurements. Both the third and fifth grades showed significant gains in reading speed as a function of time spent on independent reading. In conclusion, this experimental study showed that time spent reading independently has a positive impact on reading achievement.

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Table 1

The Mean Gain Scores and SD's for Each Condition on Dependent Variables

	3rd grade				5th grade			
	15 minutes		40 minutes		15 minutes		40 minutes	
	below grade level	at or above grade level	below grade level	at or above grade level	below grade level	at or above grade level	below grade level	at or above grade level
CBM WPM gain score on the same passage	25.60 (20.84)	17.06 (12.51)	35.56 (12.92)	39.93 (10.70)	20.18 (13.53)	18.61 (4.00)	18.19 (11.61)	10.60 (21.67)
CBM transfer passage in WPM	92.20 (35.89)	125.00 (19.33)	99.95 (25.47)	148.93 (35.51)	134.67 (180.67)	180.67 (32.51)	136.00 (32.83)	163.70 (23.19)
MAT-7 gain score on reading scale score	22.60 (30.47)	25.83 (35.63)	14.38 (20.73)	18.80 (20.54)	23.62 (14.81)	29.00 (39.62)	27.56 (17.78)	43.80 (30.76)
MAT-7 gain score on the vocabulary score	38.30 (28.35)	16.17 (29.73)	15.46 (31.92)	59.20 (14.31)	29.54 (28.39)	-4.33 (27.70)	19.89 (24.80)	17.70 (20.33)
STAR ¹	81.40 (72.48)	36.67 (47.63)	118.15 (63.02)	178.40 (47.62)	41.92 (106.21)	-1.83 (71.35)	75.00 (99.43)	123.20 (87.40)
STAR ²	87.40 (80.83)	107.50 (86.25)	120.69 (78.79)	194.60 (57.46)	90.85 (160.75)	80.33 (127.14)	87.00 (68.05)	179.90 (101.46)
Woodcock Johnson Word recognition gain score	8.50 (7.32)	3.83 (3.13)	7.69 (4.61)	4.80 (4.97)	3.54 (2.88)	7.83 (4.45)	8.67 (5.61)	-1.80 (7.05)
N	10	6	13	5	13	6	9	10

Note. The information presented in Tables 1 and 2 used below and at or above grade level to present the reading ability, but we used low ability group as below the grade level and high ability group as at or above grade level in the result section to present the result. STAR¹: the gain scores on the STAR between fall and winter. STAR²: the gain scores on the STAR between fall and spring.

Table 2

The Marginal Mean Gain Scores and SD's for Treatment, Grade, and Reading Level on Dependent Variables

	Time Spent on Reading		Grade		Reading Ability	
	15	40	3	5	Below grade level	At or above grade level
	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>
	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)
CBM WPM gain score on the same passage	20.92 (14.67)	25.18 (18.87)	30.01 (16.74)	16.94 (14.84)	25.43 (16.06)	19.25 (18.05)
CBM transfer passage in WPM	128.76 (41.82)	132.57 (37.73)	109.29 (34.68)	149.89 (33.59)	115.47 (35.61)	156.14 (32.40)
MAT-7 gain score on reading scale score	24.63 (27.31)	36.11 (26.13)	19.47 (25.95)	30.71 (25.47)	21.51 (21.17)	31.89 (32.19)
MAT-7 gain score on the vocabulary score	23.94 (31.06)	18.74 (21.93)	28.74 (31.86)	18.79 (26.95)	25.49 (29.19)	20.15 (30.49)
STAR ¹	44.80 (85.13)	100.37 (93.94)	101.82 (73.40)	64.24 (100.96)	79.33 (88.86)	86.41 (94.47)
STAR ²	90.91 (119.97)	135.89 (97.35)	119.44 (82.22)	111.71 (125.65)	97.93 (105.53)	144.41 (104.12)
Woodcock Johnson Word recognition gain score	5.74 (5.19)	3.16 (8.23)	6.82 (5.50)	4.03 (6.41)	6.87 (5.43)	2.81 (6.46)
N	35	37	34	38	45	27

Note. The information presented in Tables 1 and 2 used below and at or above grade level to present the reading ability, but we used low ability group as below the grade level and high ability group as at or above grade level in the result section to present the result. STAR¹: the gain scores on the STAR between fall and winter. STAR²: the gain scores on the STAR between fall and spring.