

# Independent versus Computer-Assisted Reading: Equal-time Comparison of Sustained Silent Reading to an Automated Reading Tutor that Listens

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## Abstract

A 7-month study of 178 students in grades 1-4 at two schools compared two daily 20-minute treatments. 88 students did Sustained Silent Reading (SSR) in their classrooms. 90 students in 10-computer labs used the 2000 version of Project LISTEN's Reading Tutor (RT), which listens to a child read aloud, and gives spoken and graphical assistance. The RT group significantly outgained their statistically matched SSR classmates in word identification, word comprehension, passage comprehension, fluency, phonemic awareness, rapid letter naming, and spelling. The Reading Tutor made the greatest difference in grade 1, where effect sizes for these skills ranged from .20 to .72.

## Study Design

**Sample:** 178 kids in grades 1-4 at two Blue Ribbon Schools of Excellence, with mean WRMT TRC = 99.

**Treatments** (assigned randomly within class, stratified by WRMT composite pretest):

- 88 did Sustained Silent Reading (SSR) (Collins, 1980) in class. Grade 1 got read-aloud at first.
- 90 spent SSR time using the Reading Tutor (RT) (Mostow & Aist, 2001) in 10-computer labs.

**Analysis:** ANOVA took treatment and gender as fixed effects, class as a random effect, and significant pretests as covariates.  $p$  and ES are significance and effect size for estimated effects of treatment.

## Results

**Woodcock Reading Mastery Test (normed)** (Woodcock, 1998): Compared to their classmates in SSR, first graders who used the Reading Tutor gained more in Total Reading Composite score ( $N=75$ ,  $p=.04$ ,  $ES=.42$ ). So did second and third graders ( $ES .28$  and  $.54$ ), albeit not significantly ( $p > .2$ ). Fourth graders gained negligibly less. Differences were significant on 3 of the 4 subtests that comprise the composite:

Word Identification: RT outgained SSR in every grade, but the difference was significant only in grade 1 ( $p=.12$ ,  $ES=.27$ ).

Word Attack: RT gained more in grade 3 ( $N=35$ ,  $p=.05$ ,  $ES=.79$ ) but possibly less in grade 4 ( $N=29$ ,  $p=.14$ ,  $ES=.58$ ), with  $p > .3$  in grades 1-2.

Word Comprehension: RT outgained SSR in grade 1 ( $p=.02$ ,  $ES=.51$ ), with  $p > .5$  in other grades.

Passage Comprehension: RT gained more in every grade, but the difference was significant only in grade 1 ( $p=.05$ ,  $ES=.38$ ), with  $p > .4$  in other grades.

**Phonemic Awareness** (blending + elision from CTOPP (Wagner, Torgesen, & Rashotte, 1999)): RT outgained SSR in grade 1 (N=75,  $p=.03$ ,  $ES=.55$ ) and grade 2 (N=39,  $p=.11$ ,  $ES=.59$ ). Differences in grades 3-4 were negligible ( $p>.6$ ,  $ES<.2$ ).

**Rapid Letter Naming (in seconds)** from CTOPP: RT sped up in letter naming more than SSR in every grade, but the difference approached significance only in grade 1 ( $p=.12$ ,  $ES=.20$ ).

**Fluency (words per minute on grade-level text)**: RT outgained SSR in grades 1-3. The difference was significant only in grade 1 ( $p=.02$ ,  $ES=.64$ ), but still large in grades 2 ( $ES=.39$ ) and 3 ( $ES=.45$ ).

**Test of Written Spelling (normed)** (Larsen, Hammill, & Moats, 1999): RT considerably outgained SSR in grade 1 ( $p=.01$ ,  $ES=.72$ ) and (albeit not significantly) in grade 2 (N=73,  $p=.24$ ,  $ES=.47$ ). Differences in grades 3-4 were insignificant ( $p>.26$ ).

**Elementary Reading Attitude Survey** (McKenna, Kear, & Ellsworth, 1995): ERAS scores, as is typical, declined in every grade. RT declined more than SSR in grade 2 (N=38,  $p=.08$ ,  $ES=.54$ ) and grade 4 (N=29,  $p=.06$ ,  $ES=.80$ ).

## Conclusions

Was the Reading Tutor more effective than Sustained Silent Reading? Yes! Overall, RT outgained SSR in WRMT Total Reading Composite (and 3 of its 4 subtests), fluency, spelling, rapid letter naming, and phonemic awareness (both blending and elision). For the only two other outcomes we measured, the overall difference was not significant. For Word Attack, RT won in grade 3 and (maybe) SSR in grade 4. Reading Attitude declined less for SSR in grade 2 but less for RT in grade 4.

Which students did the Reading Tutor help the most? Treatment differences were greatest in grade 1. Grade 1 averaged normed scores of 100 for total reading composite, 102 for phonemic awareness, and 104 for word identification, so this group was near the mean of the national norming sample. To see who gained most, we plotted gains against pretest scores. Students with lower pretest scores gained more, as expected due to regression to the mean. However, differences between treatments was fairly independent of pretest scores, and in some cases greater for students with higher pretest scores.

Gender was a significant predictor ( $p=.04$ ) for changes in reading attitude (girls' declined less in SSR, more in RT) and rapid letter naming (girls sped up more in both), but did not interact significantly with treatment except in isolated cases:

Grade 2 Word Attack ( $p=.04$ ), Word Comprehension ( $p=.02$ ), and Reading Composite ( $p=.01$ ): 9 boys outgained 9 girls in RT, while 17 girls outgained 4 boys in SSR.

Word Comprehension in grade 4 ( $p=.02$ ): 5 SSR girls outgained 8 boys; 10 RT boys outgained 6 girls.

Class was significant in a few cases but did not interact significantly with treatment except possibly in grade 2 phonemic awareness (N=39,  $p=.08$ ). RT averaged 919 points higher than SSR in 4 of 5 rooms, but 5 points lower in one room.

Which skills benefitted most? Within grade 1, effect sizes were large for spelling (.72), moderate for fluency (.64), phonemic awareness (.55), word comprehension (.51), and total reading composite (.42), and smaller for passage comprehension (.38), word identification (.27), and rapid letter naming (.20).

In summary, the 2000-2001 version of the Reading Tutor helped students – especially first graders -- gain significantly more in almost every reading skill we measured than their statistically matched classmates who spent the same time in Sustained Silent Reading, even though the experiment manipulated only 20 minutes out of a day full of excellent instruction. This experiment demonstrates that computer assisted reading in the 2000 version of Project LISTEN's Reading Tutor helped first graders more than independent reading as implemented in Sustained Silent Reading.

## References

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