Guided Independent Reading

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Accelerated Reader®

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Introduction

In 2003, company co-founder Terry Paul published the seminal *Guided Independent Reading* report, which summarized research from a base of Renaissance Learning customers that served to shape the Accelerated Reader (AR) Best Practices. The original report included data from 50,823 students across 24 states, a sizeable sample for the time. Since then, technological advances have allowed Renaissance Learning to offer a service of hosting customer data on company servers, resulting in a more cost-effective customer experience and a product information database of considerable size and scope. In the same spirit of the initial Paul (2003) manuscript, we have updated the report using current information and larger sample sizes, to once again evaluate and inform recommendations for guided independent reading. Specifically, the current report draws upon data collected during the 2010–2011 school year and includes more than 2 million students representing all 50 states and the District of Columbia.

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In addition to an updated, larger sample, the new report also takes into account changes in the national landscape concerning educational policies and practices. Since 2003, emphasis has shifted from No Child Left Behind policies and adequate yearly progress measures to college- and career-readiness initiatives such as those outlined in the 2010 Common Core State Standards (CCSS) and other revised state standards. For example, recent initiatives have led to an increased interest in issues related to text complexity, such as how it should be measured and what recommendations should be used for student reading. Another change is increased emphasis on student growth, as per guidance from the U.S. Department of Education in its Elementary and Secondary Education Act (ESEA) waiver program. Schools are under increasing pressure to demonstrate that students are growing sufficiently in their academic abilities. The research and recommendations on the following pages take recent education policies and reforms into consideration as well as present relevant information to help inform decisions about modern classroom practices.

Guided independent reading

Across the board, practice is recognized as an essential component of any learning process (Willingham, 2009). Similarly, emphasizing the role of practice and hard work (rather than fixed intelligence) in academic accomplishments is beneficial for both motivation and performance (Mueller & Dweck, 1998). As it relates to reading in particular, research indicates that time spent reading books is the best predictor of overall academic achievement, even more so than socioeconomic status or ethnicity (Kirsch et al., 2002). Reading practice builds vocabulary, fluency, comprehension, writing, and higher order thinking skills (e.g., Anderson, Wilson, & Filding, 1988; Baker, Simmons, & Kameenui, 1998; Greenfield, 2009; Guthrie, Wigfield, Metsala, & Cox, 1999; Reitsma, 1988) as well as enhances general abilities such as visual information processing and speech perception (Dehaene et al., 2010; McBride-Chang et al., 2011). Though beneficial in all forms, reading practice is most effective when guided—that is, when it is coupled with feedback and instructional support tailored to the individual student (Ericsson, Krampe, & Tesch-Römer, 1993; Paul, 2003; Snow, 2002). Thus, educators should provide plenty of opportunities for in-class reading practice in which they (1) help students identify appropriate books, (2) monitor students' progress, and (3) intervene to provide instruction or adjust goals as needed.

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Accelerated Reader

Creating personalized reading practice of this nature requires thorough knowledge of student performance. Monitoring every student's reading practice can quickly become overwhelming without the help of technology, which is one reason why Accelerated Reader has become the nation's most popular supplemental reading program (Resnick, Sanislo, & Oda, 2010).

Accelerated Reader is a technology tool that enables differentiated, data-driven reading practice, making the essential student practice component of any reading curriculum more effective. This practice time is personalized to each student's individual level to ensure a high rate of success and is immediately followed by feedback to help educators target instruction. Reading practice that is personalized includes guiding students to books at appropriate levels, closely monitoring their progress, and intervening with appropriate instruction when necessary.

Figure 1: Example AR Reading Practice Quiz Item

Within Accelerated Reader, four types of computerized quizzes are available. Reading Practice Quizzes form the cornerstone of Accelerated Reader, and are quick and effective means of assessing literal comprehension. Consisting of 5, 10, or 20 multiple-choice questions, and available for more than 140,000 books, they are the most commonly used type of quiz (see quiz item example, Figure 1). Variations on Reading Practice Quizzes are available to help teachers monitor reading comprehension for students with different abilities. Recorded Voice Quizzes can be used with preliterate, struggling, and emergent readers, and Spanish Quizzes are available for use with Spanish bilingual, English language learner (ELL), and Spanish language learning students. As a supplement to Reading Practice Quizzes, Vocabulary Practice Quizzes are also available to test knowledge of key vocabulary words students encounter during independent reading. In addition, Other Reading Quizzes can be used to assess comprehension for textbook material, and Literacy Skill Quizzes measure higher order reading skills.

A growing collection of research indicates that Accelerated Reader is a highly effective program. The research evidence on Accelerated Reader includes experimental and quasi-experimental studies published in peer-reviewed journals. The sizable body of research on Accelerated Reader has contributed to favorable reviews by external panels such as the Florida Center for Reading Research, the National Center on Student Progress Monitoring, and the National Dropout Prevention Center. Renaissance Learning (2012a) has published a summary of key studies supporting Accelerated Reader and more than 150 additional research pieces are available on Renaissance Learning's website (http://research.renlearn.com/).

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Using Accelerated Reader for guided independent reading involves three basic steps. First, students read books that match their unique achievement levels and interests. Then, students take Reading Practice Quizzes to determine whether they understood what they read. Finally, both students and teachers receive immediate feedback about students' reading practice. Accelerated Reader automatically scores each quiz and generates reports with straight-forward, comprehensive data summaries to help guide students to appropriate books, monitor reading practice, and target instruction.
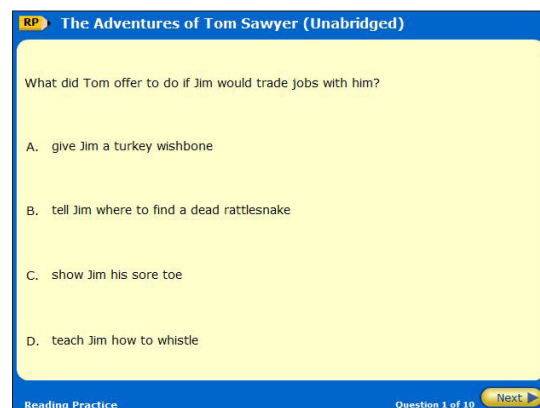
This type of performance feedback encourages an academic self-awareness that is important in effective learning and goal pursuit. Positive feedback in particular is thought to foster feelings of competence, enhance intrinsic motivation, and improve performance (Deci & Ryan, 1985; Harackiewicz, 1979). Similarly, research suggests the anticipation of quicker feedback leads to better performance (Kettle & Häubl, 2010).

Accelerated Reader Best Practices: Factors of Interest

In using Accelerated Reader reports to guide independent reading, educators are encouraged to focus on three main factors related to reading practice: comprehension (quality), time spent reading (quantity), and the level of challenge presented by the text (difficulty).[1]

Quality

When using Accelerated Reader, students' reading comprehension can be estimated using average percent correct (APC) on Reading Practice Quizzes. Higher APC values reflect better performance on quizzes, signaling a better understanding and recollection of the material being read. Adequate comprehension levels are very important for guided independent reading because they indicate that students are reading appropriately challenging text. APC values that are extremely high or extremely low suggest a student may be reading books that are too easy or too difficult, respectively.

Reading comprehension is an important factor because it is linked to critical-thinking ability, a heavily-emphasized skill in twenty-first century literacy programs. Past research has indicated that experienced readers tend to also be more reflective (Kagan, 1965). Similarly, a more recent study conducted by ACT (2006) found that students who had better literal comprehension also had better inferential comprehension (i.e., critical thinking) to the same degree, and that both literal and inferential comprehension were equally good predictors of college readiness (see Figure 2, next page). These findings suggest that accurately assessing students' reading comprehension can also provide a good sense of their potential for critical thinking and that encouraging reading practice at the appropriate level is one of the most powerful activities teachers can do to foster students' critical thinking.[2]

> Educators are encouraged to focus on three main factors related to reading practice: comprehension (quality), time spent reading (quantity), and the level of challenge presented by the text (difficulty).

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[1] Using different methods, both Paul (2003) and Borman and Dowling (2004) concluded that comprehension, time, and challenge were key components of independent reading that contributed to growth in overall reading ability.

[2] For more in-depth discussion on this topic, see *AR, Reading Comprehension, and Critical Thinking,* available online from http://doc.renlearn.com/KMNet/R001183909GDE62C.pdf

Figure 2: Performance on the ACT Reading Test by Comprehension Level (Averaged Across Seven Forms)
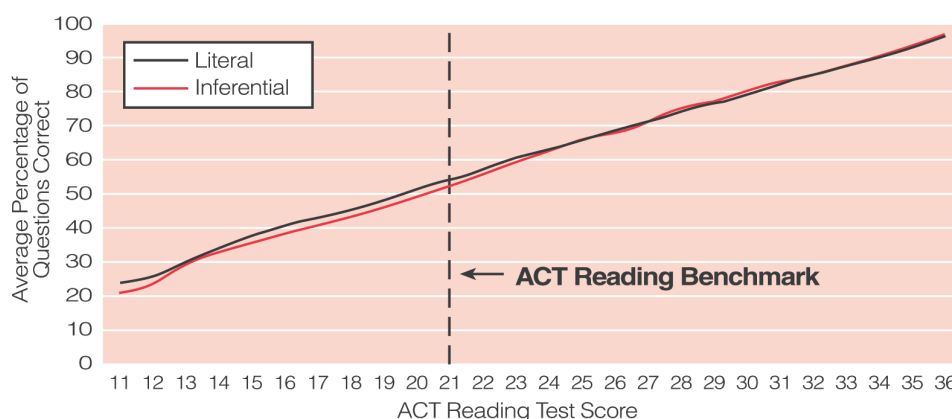
Note: Analysis was based on students who took any of seven test forms administered between fall 2003 and spring 2005. It was not possible to analyze performance below a score of 11 due to the small number of students scoring in this range.

Reprinted with permission from ACT, Inc. (2006). *Reading between the lines: What the ACT reveals about college readiness in reading.* Iowa City, IA: Author.

Quantity

In addition to knowing how well students understand what they are reading, it is also important to ensure they are spending enough time reading. Similar to reading comprehension, more time spent reading out of class is also associated with improved critical-thinking skills (Terenzini, Springer, Pascarella, & Nora, 1995). Accelerated Reader provides engaged reading time (ERT) as a metric for quantity of student reading. Estimated engaged reading time is derived from Accelerated Reader points. For each Reading Practice Quiz taken by a student, Accelerated Reader points are calculated based on the length of the book and the students' performance (i.e., number of items correct) on the quiz. These points are then used to calculate an estimate of ERT.[3]

$$\text{AR points earned} = \frac{10 + \text{ATOS Book level}}{10} \times \frac{\text{words in book}}{10} .000$$

$$\text{ERT} = \frac{(\text{AR points earned}) \times (\text{minutes per point value})}{\text{school days}}$$

As opposed to allocated time, this calculation provides an estimate of engaged reading time, which is more useful for predicting academic learning (Berliner, 1990). Engaged reading time is a subset of allocated reading time; thus, ERT is almost always less than the scheduled reading time. Any number of factors can prevent readers from fully engaging with the text for 100% of the scheduled time. Students may need time to find their book, get distracted, or have trouble focusing. For these reasons and more, the time they spend engaged with a text is often less than the time scheduled for reading.

Difficulty

In addition to comprehension and quantity, finding the right level of text difficulty in reading practice is also important. Books that are too difficult lead to frustration and lack of understanding; they do little to build reading skills, confidence, or students' knowledge base. Alternatively, books that are too easy result in boredom and more limited reading experiences, which can also be detrimental to students' motivation,

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[3] In computing ERT, the minutes per point value is based on a student's score from the STAR Reading assessment, a norm-referenced, standardized measure of general reading achievement.

general reading achievement, and acquisition of background knowledge. Comprehension levels as expressed in APC values on quizzes can provide a sense of whether students are reading at appropriate levels; however, using just APC to guide students to the right balance of difficulty in their reading might prove to be a difficulty in itself. It may take time to accumulate enough quizzes to have a meaningful APC, and there may be times when there are difficult-to-interpret fluctuations in individual quiz performance that can make it hard to get a sense of APC.

To help match students to appropriate reading materials, Accelerated Reader provides information about ZPD ranges and ATOS book levels. Borrowing from Vygotsky's (1962) influential concept of the *zone of proximal development*, ZPD refers to a range of optimal reading levels in which assistance to discover the meaning of new words and concepts is provided by the known portion of text. Though the material is read independently, when done at the correct level, the text itself provides a sort of instructional scaffolding, resulting in superior academic benefits compared to reading done above or below the ZPD range.

> ## ATOS is a valid and reliable estimate of quantitative text complexity.
>
> Nelson, Perfetti, Liben, & Liben, 2011

ZPD ranges are reported in terms of ATOS book levels. Arguably the most widely used system for matching books to students in the United States (Resnick et al., 2010), ATOS is a valid and reliable estimate of quantitative text complexity (Nelson, Perfetti, Liben, & Liben, 2011). The formula that underlies ATOS is based on words per sentence, average grade level of words, and characters per word (Milone, 2012). ATOS book levels are reported on a grade-level scale so that both student achievement and books share the same easy-to-interpret metric. For example, a student with a suggested ZPD range of 1.0 to 2.5 would likely benefit from reading books written at a difficulty level between a beginning-first-grade to middle-second-grade level. Suggested ZPD ranges are based on grade equivalent (GE) scores provided by norm-referenced reading assessments such as STAR Reading (Renaissance Learning, 2012b). Once teachers have a sense of each student's ZPD range, they can help students use it as a guide to finding books with ATOS book levels within that range.[4]

In general, as GE scores get higher, ZPD bands tend to get wider, encouraging students to read more challenging texts, but also encouraging them to continue reading a breadth of materials within wide ranges of text complexity (see Figure 3).

Figure 3: Suggested ZPD Ranges per STAR Reading Grade Equivalent Score

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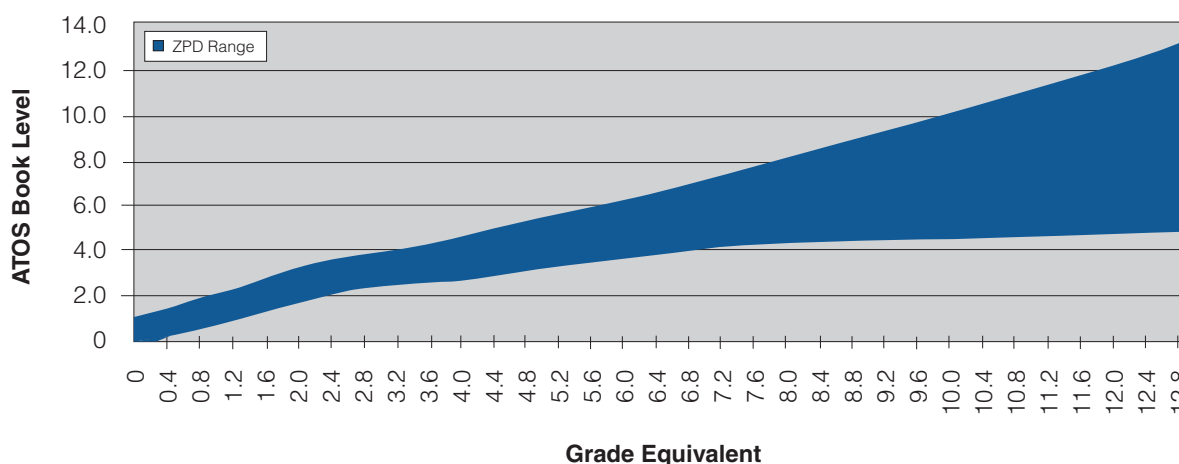
[4] ATOS book level is intended to work together with a book's interest level (IL) to inform the book-selection process. Interest levels are based on publisher recommendations and provide a qualitative measure that refers to the sophistication and maturity level of a book's content, ideas, and themes. Interest levels are divided into four categories: LG for lower grades (K–3), MG for middle grades (4–8), MG+ for middle grades plus (6 and up, for more mature middle-grade readers), and UG for upper grades (9–12).

ATOS book levels, interest levels, and other book information (e.g., author, fiction/nonfiction designation, and student ratings) are available using an online search tool called AR BookFinder (http://www.arbookfind.com). Tens of thousands of books are available in AR BookFinder, and for books or texts not in AR BookFinder, an ATOS book level can be calculated within moments using the free online ATOS Analyzer (http://www.renlearn.com/ar/overview/atos/).

> Independent reading is most successful when students comprehend what they read, spend sufficient time reading, and are encouraged to read books of appropriate difficulty.
>
> Borman & Dowling, 2004; Paul, 2003

In summary, independent reading is most successful when students comprehend what they read, spend sufficient time reading, and are encouraged to read books of appropriate difficulty (Borman & Dowling, 2004; Paul, 2003). Extending on previous research, what follows presents research on how these three factors contribute to growth in overall reading achievement. We then discuss how the current results relate to both previous findings and trends in educational policy, as well as their implications for AR Best Practices.

Research Summary

The study described in the remainder of this paper is based on data from hosted customers' AR Reading Practice Quizzes and STAR Reading assessments taken during the 2010–2011 school year. The sample consists of students who used Accelerated Reader and completed both a STAR Reading pretest and posttest.[5] The final dataset included information for more than 100 million quizzes taken by more than 2 million students in grades 1 through 12 (see Tables 1 and 2).

Table 1: Student and Quiz Frequency by Grade

Grade	Students	Quizzes Taken	Quizzes Passed	Average Quizzes Passed Per Student
1	171,450	11,061,061	10,199,931	59.5
2	394,265	30,478,622	27,578,140	70.0
3	423,972	28,661,024	25,659,514	60.5
4	409,444	19,841,693	17,490,381	42.7
5	350,478	12,929,176	11,376,623	32.5
6	209,531	5,032,449	4,379,623	20.9
7	156,687	2,610,643	2,233,394	14.3
8	112,108	1,624,464	1,404,945	12.5
9	25,007	245,209	210,424	8.4
10	15,373	141,840	124,167	8.1
11	10,894	91,088	78,491	7.2
12	5,255	46,626	40,313	7.7
Total	2,284,464	112,763,895	100,775,946	44.1

[5] A pretest was considered the first assessment taken before October 15, 2010; a posttest was considered the last assessment taken after April 15, 2011.

Table 2: Sample Size Broken Down by Student Grade and Pretest Achievement Level

Grade	1 (PR 1–10)	2 (PR 11–20)	3 (PR 21–30)	4 (PR 1–40)	5 (PR 41–50)	6 (PR 51–60)	7 (PR 61–70)	8 (PR 71–80)	9 (PR 81–90)	10 (PR 91–100)	Total
1	27,440	20,409	15,176	15,233	16,866	18,787	16,509	14,407	14,639	11,984	171,450
2	61,358	39,601	36,176	33,087	33,224	33,957	34,168	36,934	41,278	44,482	394,265
3	75,776	44,360	43,742	38,844	40,061	40,850	38,170	40,725	38,469	22,975	423,972
4	67,729	39,499	40,194	39,527	40,533	42,887	43,148	43,455	30,394	22,078	409,444
5	51,020	33,387	34,035	38,000	37,819	41,556	35,769	29,466	28,264	21,162	350,478
6	31,490	22,135	23,827	24,396	22,911	19,164	20,550	17,593	18,411	9,054	209,531
7	26,551	19,132	18,538	16,979	16,274	14,683	15,537	13,788	10,822	4,383	156,687
8	19,889	14,162	12,701	12,191	11,335	11,972	11,039	9,787	6,284	2,748	112,108
9	5,915	3,626	2,952	2,666	2,638	2,247	2,137	1,438	1,082	306	25,007
10	4,063	2,052	1,642	1,610	1,478	1,403	1,070	977	850	228	15,373
11	2,668	1,351	1139	1,173	1,086	1141	777	872	424	263	10,894
12	1,266	637	526	581	584	465	397	414	230	155	5,255
Total	375,165	240,351	230,648	224,287	224,809	229,112	219,271	209,856	191,147	139,818	2,284,464

Key factors in guided independent reading

Previous research has indicated that quality of comprehension (average percent correct, APC), quantity (engaged reading time, ERT), and difficulty (zone of proximal development, ZPD) were key factors to consider in creating effective independent reading practice that would contribute to growth in students' general reading achievement (Borman & Dowling, 2004; Paul, 2003). In an effort to replicate previous findings with a more recent sample, a multiple regression analysis was conducted to explore whether these factors accounted for a significant amount of variance in STAR Reading gains across the school year. As shown in Table 3, STAR Reading posttest normal curve equivalent (NCE) scores[6] were simultaneously regressed onto standardized variables[7] for APC, ERT, and ZPD while controlling for pretest scores (see also Table 4, next page).

Table 3: STAR Reading Posttest NCE Regressed Onto APC, ERT, and ZPD While Controlling for Pretest NCE

Factor	β	SE	t	p
Constant	45.35	0.01	5818.84	< .001
z(Pretest NCE)	15.48	0.01	1800.49	< .001
z(APC)	3.07	0.01	319.53	< .001
z(ERT)	0.54	0.01	64.21	< .001
z(Percent Quizzes Passed Within or Above ZPD)	1.36	0.01	172.98	< .001

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[6] NCEs are a way of representing percentile scores so they can be accurately averaged and compared with each other. Because NCEs are derived from percentiles, they measure growth in comparison to national norms. Positive NCE gains mean student achievement grew at a faster rate than national averages. An NCE gain of zero represents the national average.

[7] Z scores were used so that all the measures had the same scale, with a mean of zero and standard deviation of one.

Table 4: Descriptive Statistics for APC, ERT, and ZPD

Factor	M	SD
Average Percent Correct (APC)	81.0%	14.0%
Engaged Reading Time (ERT)	26.2	26.7
Percent Quizzes Passed Within Or Above ZPD	67.9%	26.2%

The beta values indicate that, of the three factors, comprehension (APC) accounted for the most variance in STAR Reading gains (β = 3.07), suggesting that students' success on Accelerated Reader quizzes is the most important factor to consider when guiding their independent reading. Controlling for the other factors, a one standard deviation (14%) increase in APC was associated with a 3.07 increase in STAR Reading posttest NCE scores. Both ERT and ZPD were also significant predictors of positive STAR Reading growth, but not to the same degree as APC. Controlling for the other factors, a one standard deviation (26.7 min.) increase in ERT was associated with a .54 increase in STAR Reading posttest NCE scores, and a one standard deviation (26.2%) increase in the amount of reading done within or above ZPD was associated with a 1.36 increase in STAR Reading posttest NCE scores.

Average percent correct
To better understand the relationship between Reading Practice Quiz performance and general reading achievement, STAR Reading achievement was evaluated for different APC ranges. STAR Reading gain scores were computed by subtracting pretest NCE from posttest NCE (see Table 5 and Figure 4).

Table 5: STAR Reading NCE Gain Broken Down by APC

Average Percent Correct (APC)	n	M	SD
<= 60%	212,039	-1.51	13.51
60.01–65%	81,184	-0.87	13.33
65.01–75%	288,848	-0.39	13.29
75.01–85%	585,619	0.17	13.10
85.01–95%	921,294	0.50	12.88
95.01–100%	195,480	0.39	12.61
Total	2,284,464	0.06	13.06

Figure 4: Students Experience Greatest Reading Growth With Averages Between 85.01 and 95 Percent
(n = 2,284,464, 2010–2011 School Year)
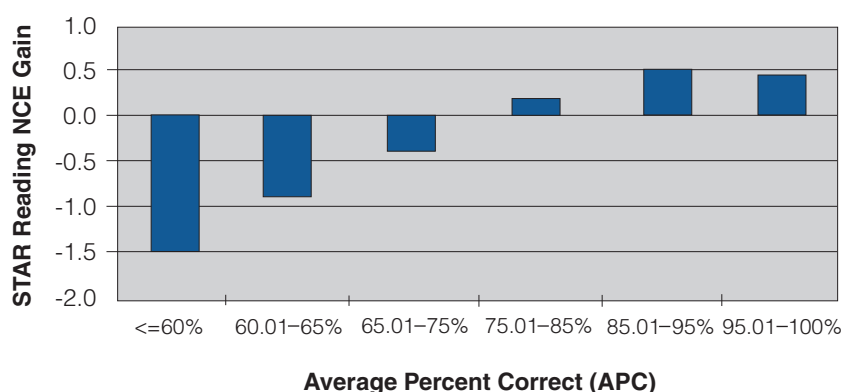
The results indicate that students with an APC less than 75% on AR Reading Practice Quizzes had negative STAR Reading gains. This suggests that although 60% is generally considered a passing score for individual quizzes, consistently scoring in the barely-passing zone was not productive for developing general reading ability. Once students reached APC levels between 75% and 85%, they experienced gains in STAR Reading. On average, students experienced the most gains when they had an APC between 85% and 95%.

It is important to note that STAR Reading gains began to decline at extremely high APC ranges above 95%. This trend suggests that students who have an APC above 95% may be reading books that are too easy. At these very high levels of comprehension, students still benefit from reading and experience gains in STAR Reading across the school year; however, their gains are not as great as they could be were they to read more challenging books resulting in APC values between 85% and 95%. It may be counterintuitive to suggest that less comprehension is better, but students with APC levels above 95% are receiving perfect scores of 100% correct an almost all of their quizzes. Though a high degree of comprehension is important, receiving perfect scores at such high frequencies is most likely an indication of lack of text difficulty.

Engaged reading time
A similar analysis was conducted to explore trends in STAR Reading gains for different ERT ranges (see Table 6 and Figure 5).

Table 6: STAR Reading NCE Gain Broken Down by ERT

Engaged Reading Time (ERT)	n	M	SD
< 5 min.	379,126	-0.85	13.50
5–14 min.	556,288	-0.15	13.34
15–24 min.	430,610	0.31	13.03
25–34 min.	317,867	0.44	12.78
35–44 min.	206,929	0.48	12.77
45–54 min.	128,711	0.48	12.69
55–64 min.	80,386	0.48	12.61
65+ min.	163,442	0.38	12.40
Total	2,263,359	0.06	13.06

Figure 5: Gains Leap When Students Are Actively Engaged in Reading at Least 15 to 24 Minutes per Day
(n = 2,263,359, 2010–2011 School Year)
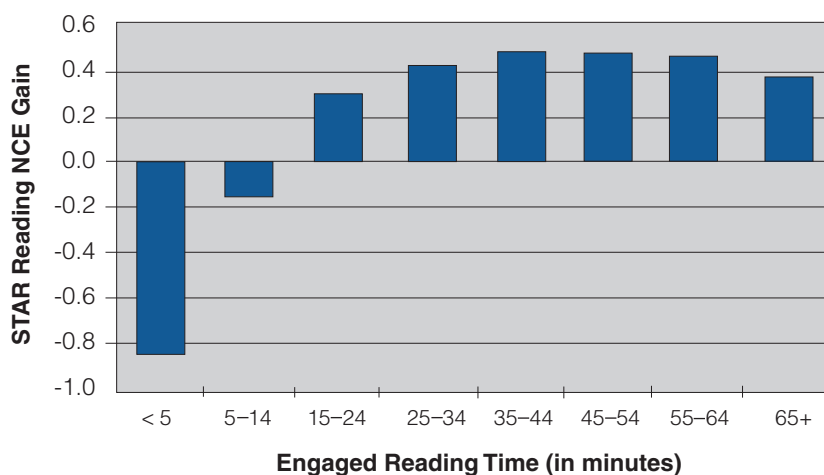
In general, the ERT results indicate that students need to be actively engaged in reading. An ERT of less than 5 minutes was associated with large negative changes in STAR Reading scores, suggesting that students need to be reading at least 5 minutes per day to avoid falling behind in their general reading ability. Students with ERT values greater than 15 minutes had positive gains in STAR Reading, indicating that as little as 15 to 24 minutes has notable benefits in general reading ability for a very reasonable amount of time spent reading. An ERT of 25 minutes or more was slightly more beneficial, but was approaching the point of minimal gain in benefits.

> It is important to note the distinction between *engaged* reading time and *actual* reading time. ERT is typically only a fraction of actual scheduled reading time.

In interpreting results for ERT, it is important to note the distinction between *engaged* reading time and *actual* reading time. ERT is typically only a fraction of actual scheduled reading time. Based on customer feedback and classroom observations, we estimate that an ERT of 25 minutes would require about 35 minutes of scheduled reading time for most students.

Zone of proximal development

Finally, a set of analyses was conducted to explore how variations in the level of difficulty presented in the text related to general reading ability.

STAR Reading grade-equivalent scores are the basis for estimating ZPD ranges for guided independent reading. Using growth norms, STAR Reading pretest scores were projected to the time of each AR Reading Practice Quiz and then used to estimate students' suggested ZPD range. The growth norms reflect the typical amount of growth (in scaled scores) made by a student in a given week. They are decile, grade, and subject specific, meaning they take into account students' grade and initial performance in predicting weekly growth. Because growth norms were used to compute projected scores, ZPD ranges were not static across the school year. They were adjusted to the time each quiz was taken in order to account for gains in reading achievement made during the school year. This addresses a limitation of previous research that treated ZPD as a constant, using students' initial range to evaluate reading practice throughout the year (Borman & Dowling, 2004; Paul, 2003).

Quiz frequencies (see Table 7) indicate that the majority (54%) of Reading Practice Quizzes were taken for books within the student's suggested ZPD, 34% were taken for books below ZPD, and 12% for books above ZPD. Also, students were most likely to pass quizzes for books below the suggested ZPD (94% passed), were slightly less likely to pass within-ZPD quizzes (90% passed), and were least likely to pass above-ZPD quizzes (74% passed).

Table 7: Quiz Frequency and Performance per Suggested ZPD Range

ZPD	Quizzes Taken		Quizzes Passed	
Below	38,862,527	34%	36,518,495	94%
Within	60,443,185	54%	54,266,663	90%
Above	13,458,183	12%	9,990,788	74%
Total	112,763,895		100,775,946	89%

Three multiple regression analyses were conducted to explore the effects of reading below, within, and above the suggested ZPD on STAR Reading performance. As Table 8 shows, STAR Reading posttest NCE scores were regressed onto the percent of quizzes passed below, within, or above ZPD while controlling for pretest scores, the total number of passed quizzes, APC, and ERT).

Table 8: Multiple Regression Analyses Regressing STAR Reading Posttest NCE Onto Percent Quizzes Passed for Each ZPD Category While Controlling for Pretest NCE, Quizzes Passed, APC, and ERT

Factor	β	SE	t	p
Constant	47.29	0.01	3739.70	< .001
z(STAR Reading Pretest NCE)	15.58	0.01	1804.69	< .001
z(Total Quizzes Passed)	1.09	0.01	102.50	< .001
z(APC)	3.05	0.01	317.52	< .001
z(ERT)	-0.21	0.01	-18.40	< .001
% Quizzes Passed for Books Below ZPD	**-6.05**	**0.03**	**-194.30**	**< .001**
Constant	44.13	0.02	2244.80	< .001
z(STAR Reading Pretest NCE)	15.27	0.01	1757.35	< .001
z(Total Quizzes Passed)	0.70	0.01	65.93	< .001
z(APC)	2.96	0.01	306.25	< .001
z(ERT)	0.21	0.01	19.14	0.018
% Quizzes Passed for Books Within ZPD	**2.17**	**0.03**	**68.11**	**< .001**
Constant	44.28	0.01	4653.46	< .001
z(STAR Reading Pretest NCE)	16.04	0.01	1732.93	< .001
z(Total Quizzes Passed)	0.73	0.01	70.90	< .001
z(APC)	3.20	0.01	331.79	< .001
z(ERT)	0.06	0.01	5.58	< .001
% Quizzes Passed for Books Above ZPD	**9.33**	**0.05**	**194.95**	**< .001**

Results indicate that students should avoid a large amount of reading below the suggested ZPD. A higher percent of passed quizzes for books below the suggested ZPD was associated with negative gains in STAR Reading. Controlling for other factors, each additional percent of quizzes passed below the suggested ZPD was associated with a 6.05 point decrease in posttest NCE.

Confirming prior results, reading within the suggested ZPD was beneficial. Passing quizzesfor books within the suggested ZPD was associated with positive gains in STAR Reading. Controlling for other factors, an additional one percent of books read within the suggested ZPD was associated with a 2.17 increase in posttest NCE.

Students reading well within-ZPD can be encouraged to try reading above-ZPD, so long as they continue passing Reading Practice Quizzes.

Finally, passing quizzes for books above the suggested ZPD was associated with even more positive gains in STAR Reading. Controlling for other factors, each additional percent of quizzes passed above the suggested ZPD was associated with a considerable 9.33 increase in posttest NCE.

Overall, the findings suggest that reading above the suggested ZPD is rare and difficult, but if done successfully, could lead to substantial gains in general reading ability. Students reading well within-ZPD can be encouraged to try reading above-ZPD, so long as they continue passing Reading Practice Quizzes.

Additional analyses indicate that students with an APC of less than 60% on quizzes for books above the suggested ZPD showed slightly negative growth on STAR Reading (see Table 9).

Table 9: STAR Reading NCE Gain as a Function of Suggested ZPD and APC

	Below ZPD		Within ZPD		Above ZPD	
	M	*SD*	*M*	*SD*	*M*	*SD*
Consistently Failing (APC less than 60%)	-2.73	13.66	-2.68	13.42	-0.47	13.20
Consistently Passing (APC 60% or Higher)	-0.15	13.04	0.31	12.90	2.88	13.08

In fact, the data suggests that passing quizzes for books within the suggested ZPD is more beneficial than consistently failing quizzes for books above ZPD (see Figure 6).

Figure 6: Optimal Reading Practice Begins Within ZPD; Successful Comprehension Leads to Higher Growth
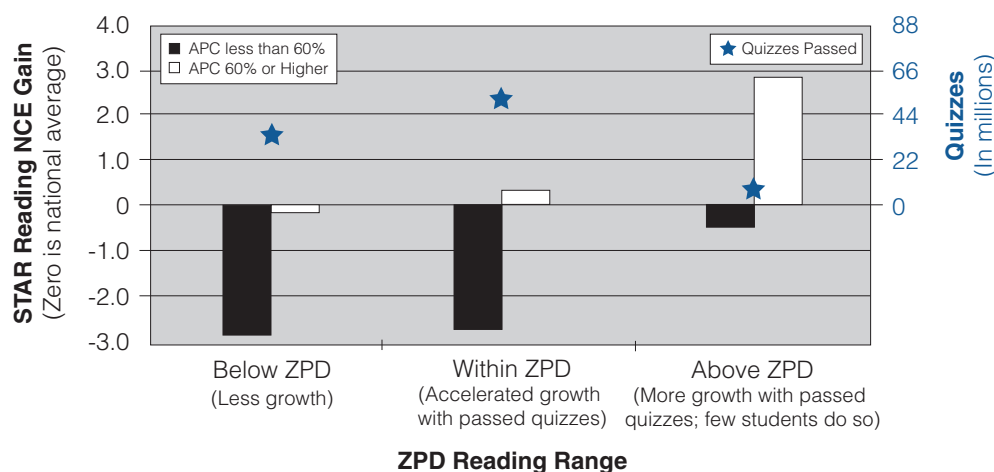
Note: The data shows students' recommended ZPD ranges are a good starting point, which may need to be adjusted up or down based on students' APCs. There is potential for greater growth when reading above ZPD, but doing so is beneficial only if students are able to maintain a reasonable APC that indicates they comprehend what they are reading. If a student consistently scores highly on books read above ZPD, it is likely time to adjust the range. Not passing AR quizzes above ZPD may mean the student is not benefitting from reading more challenging text.

In summary, average percent correct on AR quizzes is the best indicator of a student's true ZPD. STAR Reading results can help to provide an initial estimate, but APC should be frequently monitored and used to make adjustments to each student's ZPD range.

Research Implications and Accelerated Reader Best Practices

In general, the updated findings support the AR Best Practices established in the previous *Guided Independent Reading* report (Paul, 2003).

Three key reading practice factors relate strongly to the development of general reading achievement: quality, quantity, and difficulty. Of these, comprehension (quality) emerges as the most important. If students don't

understand what they are reading, other factors such as the time spent reading or the difficulty level of the reading material are of little consequence.

Quality (Comprehension)

Comprehension levels are reflected by average percent correct on Reading Practice Quizzes. For individual quiz performance, scoring at or above 60% is generally considered sufficient evidence of comprehension and accepted as a passing score. When considering average quiz performance, however, frequently scoring in the barely-passing range is an indicator that students are reading text that is too difficult for them to comprehend adequately. Students with annual APC values less than 75% had decreased growth in STAR Reading over the course of the school year. This suggests that students with APC values of 75% or lower may need additional coaching or practice with less challenging text in order to understand what they are reading.

> If students don't understand what they are reading, other factors such as the time spent reading or the difficulty level of the reading material are of little consequence.

Students with annual APC values between 75% and 85% had more favorable results. On average, students achieving these APC values, which reflect more moderate levels of comprehension, experienced positive growth between their STAR Reading pretest and posttest. Increased comprehension continued to be associated with increased growth in general reading ability. Students with APC values between 85% and 95% had the most growth of any group.

An interesting pattern emerged for students with APC values greater than 95%. Though they experienced positive growth in STAR Reading, they did not grow to the same degree as students in the 85% to 95% range. This suggests that APC values of 85% or greater reflect optimal comprehension levels, and students should be encouraged to read the most challenging text they are able to while still maintaining overall comprehension rates of 85% APC or higher. However, if students begin consistently earning only perfect scores of 100% on individual quizzes and their APC climbs into the 95% to 100% range, they are likely reading at too easy a level and would benefit from reading more complex text. This finding is consistent with college- and career-ready standards that encourage students to read more complex text,[8] but it differs from previous AR Best Practices emphasizing the "Power of 100" and recommending independent reading programs be adjusted to encourage the highest comprehension levels possible. The current findings shed light on this issue and suggest that high comprehension and retention of reading material as reflected by APC values in the 85% to 95% range are a hallmark of successful independent reading, but perfect comprehension as indicated by APC values in the 95% to 100% range signal that a student is ready for more challenge in his or her reading practice.

> Perfect comprehension as reflected by APC values in the 95% to 100% range indicate that a student is ready for more challenge in his or her reading practice.

Quantity (Engaged reading time)

In addition to adequate comprehension, another important aspect of guided independent reading is time spent reading. The amount of engaged reading time reported by Accelerated Reader reflects volume of reading practice. Results indicate that students with ERT times of about 25 minutes per day experienced considerable STAR Reading growth. An ERT of about 25 minutes represents a reasonable goal, one in which students experience maximum benefits for the time they put into their reading practice. Estimates suggest that 25 minutes of engaged reading time translates to about 35 minutes of allotted reading time. In other words,

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[8] For more in-depth discussion of Accelerated Reader, standards for text complexity, and ZPD ranges, see *Text Complexity: Accurate Estimates and Educational Recommendations*, available online from http://doc.renlearn.com/KMNet/R00548821C95879F.pdf

teachers should schedule about 35 minutes for daily guided independent reading practice, knowing that the engaged reading time estimates will be about 25 minutes for most students. ERT values greater than 25 minutes are still associated with favorable STAR Reading growth but approach ranges of minimal additional gains—in other words, students get similar benefits despite spending more time practicing.

Perhaps most striking was the ERT finding for students who averaged less than 5 minutes per day. Students with less than 5 minutes of engaged reading time had large declines in their STAR Reading scores. Findings for students in this group suggest that practicing reading for just a few minutes per day is clearly inadequate, supporting claims about the importance of practice for skill development (e.g., Willingham, 2009). To experience the benefits of reading, it's important that students actually spend time reading. Students with ERT values of less than 5 minutes are not actively participating in reading practice and are likely to fall behind in their general reading achievement.

> An ERT of about 25 minutes represents a reasonable goal, one in which students experience maximum benefits for the time they put into their reading practice.

Difficulty (Zone of proximal development)

For the most effective reading practice, students should read materials that present the right level of difficulty. In Accelerated Reader, a suggested ZPD provides a range of book difficulty levels that is likely to present the right level of difficulty given students' level of reading achievement. Findings indicate that suggested ZPDs are a good approximation of the text complexity ranges for guided independent reading. Most quizzes were taken for within-ZPD books, and a higher percentage of passed quizzes for within-ZPD books was associated with increased STAR Reading growth.

Similarly, the results suggest that students should avoid reading below the suggested ZPD range. Though students were more likely to pass quizzes for below-ZPD books than within- or above-ZPD books, a higher percentage of passed quizzes for below-ZPD books was actually associated with decreased STAR Reading growth. In guiding students' independent reading, teachers may have reasons for encouraging students to read below their suggested ZPD (e.g., reading the same books as many of their peers, reading a book for a particular experience or to build a certain knowledge base) and will have to consider the potential benefits of reading a particular low-level book given that it will most likely not contribute to the students' general reading achievement the way more complex reading would.

Finally, a surprising trend emerged for above-ZPD reading, such that a higher percentage of passed quizzes for above-ZPD books was associated with considerable STAR Reading growth, more so than within-ZPD reading. The favorable findings for above-ZPD reading are consistent with recent recommendations (e.g., CCSS, 2010a, 2010b; Nelson et al., 2011) that students should read at higher levels of text complexity in order to be better prepared for the materials they will encounter in college and career settings.[9] However, these favorable findings are tempered by additional analyses highlighting the importance of comprehension for above-ZPD reading. Students should only be encouraged to choose books above their suggested ZPD for independent reading if they can continue passing Reading Practice Quizzes. Reading difficult texts they do not adequately understand may actually lessen overall reading achievement.

> For the most effective reading practice, students should read materials that present the right level of difficulty.

This finding represents a shift in ZPD recommendations, but it is in keeping with current educational research

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[9] As mentioned previously, for more in-depth discussion of Accelerated Reader, standards for text complexity, and ZPD ranges, see *Text Complexity: Accurate Estimates and Educational Recommendations*, available online from http://doc.renlearn.com/KMNet/R00548821C95879F.pdf

and standards suggesting that students need to read more complex text in order to be adequately prepared for the demands of college and career (e.g., CCSS, 2010a, 2010b). Whereas previous AR Best Practices recommended students read within their ZPD, these current findings indicate that students should be encouraged to read above their ZPD if they are able to do so and maintain reasonable comprehension levels. For this reason, monitoring students' APC will be more important than ever in guiding their reading practice to include material that is challenging, yet comprehensible.

In general, the suggested ZPD ranges offer appropriate guidelines for matching students to books, but these ranges should be adjusted depending on students' comprehension levels. If students are receiving high percent-correct values on their Reading Practice Quizzes for within-ZPD books, then their ZPD ranges should be adjusted to include more challenging material. In adjusting ZPD ranges, we suggest first stretching the range to include higher ATOS book levels, then subsequently readjusting the range by removing low ATOS book levels (see Figure 7).
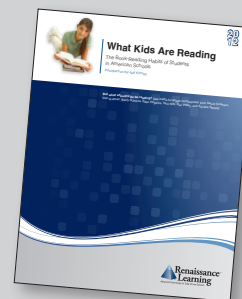
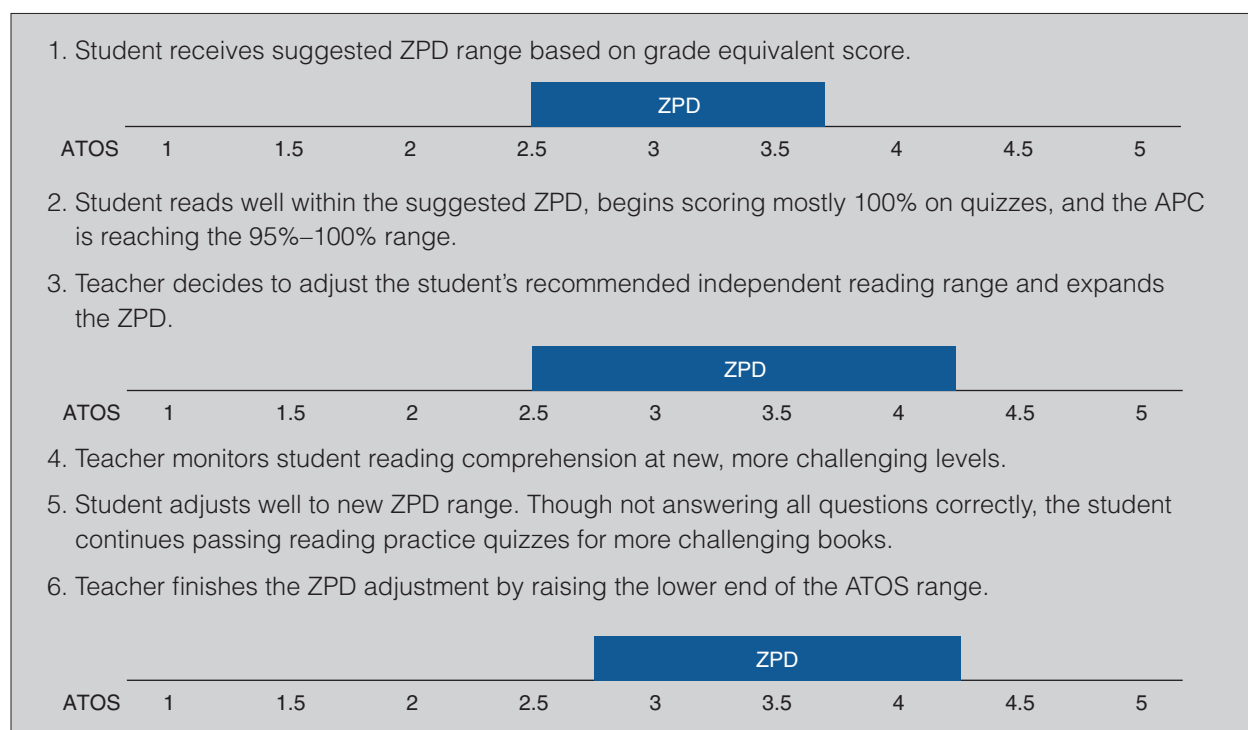**Figure 7: Example Process for Adjusting ZPDs Based on Reading Practice Quiz Performance**

1. Student receives suggested ZPD range based on grade equivalent score.

| | ZPD | | |
| ATOS | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 |

2. Student reads well within the suggested ZPD, begins scoring mostly 100% on quizzes, and the APC is reaching the 95%–100% range.

3. Teacher decides to adjust the student's recommended independent reading range and expands the ZPD.

| | ZPD | |
| ATOS | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 |

4. Teacher monitors student reading comprehension at new, more challenging levels.

5. Student adjusts well to new ZPD range. Though not answering all questions correctly, the student continues passing reading practice quizzes for more challenging books.

6. Teacher finishes the ZPD adjustment by raising the lower end of the ATOS range.

| | ZPD | |
| ATOS | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 |

As mentioned, as grade-equivalent scores get higher, ZPD bands tend to get wider, encouraging students to read more challenging texts while also reading a breadth of materials within wide ranges of text complexity (refer back to Figure 3, p. 5). As teachers adjust students' ZPD ranges following the process in Figure 7,

students capable of reading higher level text are encouraged to read within a greater band of ATOS book levels than students with less developed reading skills.

Wider bands show students the level of difficulty they can aim for in independent reading, while allowing them to dabble in books with lower ATOS books levels that may contain other desirable qualities. For example, *The Grapes of Wrath* has an ATOS book level of only 4.9 (i.e., written at an approximately fifth-grade reading level) but an upper grade interest level (i.e., contains content appropriate for readers in high school, grades 9–12). Similarly, though the CCSS (2010a) recommend that students read more complex text, they also advocate that students read broadly and focus on nonfiction material. Allowing for a wide range of text complexity in guided independent reading lets teachers and students consider a variety of relevant factors when choosing books for reading practice. Likewise, it provides guidance while still offering students a large degree of choice when selecting reading materials. Providing choice in academic settings helps to foster feelings of autonomy and self-efficacy that are both important for encouraging each student's identity as a learner as well as beneficial for intrinsic motivation and performance (Deci & Ryan, 1985).

> Reading more complex text is beneficial only as long as students are able to comprehend the material.

One caveat is that students with less developed reading skills (i.e., with lower grade-equivalent reading achievement scores) should not have ZPD bands that are so wide they are encouraged to choose books beyond their comprehension levels for independent reading practice. Reading more complex text is beneficial only as long as students are able to comprehend the material. Reading at a level so difficult as to be incomprehensible will frustrate students and will not contribute to their general reading abilities. Though recent college- and career-ready standards emphasize a need for increased text complexity, they also stress the benefits that come with building rewarding experiences into students' reading practice and the nuances that need to be considered when matching students with appropriate text. As stated in the CCSS (2010b), "Students need opportunities to stretch their reading abilities but also to experience the satisfaction and pleasure of easy, fluent reading within them…. Students' motivation, knowledge, and experiences must also come into play in text selection" (p. 9).

Conclusion

To summarize, using alternative statistical approaches and a larger, more current sample, the existing AR Best Practices based on Paul's (2003) analyses were generally supported. One key finding was the importance of students' average percent correct on AR Reading Practice Quizzes in predicting growth in general reading skills over time. This finding suggests that aiming for high levels of comprehension, as reflected by APC levels in the 85% to 95% range, should be a central focus of independent reading practice.

In addition to high APC values, another target associated with successful independent reading experiences is an ERT of at least 25 minutes per day, which would likely require a scheduled daily reading time of about 35 minutes. Finally, the findings also suggest that students' general reading skills improved from reading books within or above the recommended ZPD ranges. These ZPD-related findings indicate that students should be encouraged to read the most difficult text possible while still passing AR quizzes (i.e., while still maintaining the target APC values).

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