The Design of Accelerated Reader Assessments

Introduction

For more than 16 years, Accelerated Reader (AR) reading management software has helped teachers achieve remarkable results in their classrooms. These results range from students spending more time reading books to their increased success rate on standardized tests. In a large-scale study in Texas, for example, students in 2,500 schools that used Accelerated Reader were compared with socio-economically matched peers in 3,500 schools that did not use the program. Students in Accelerated Reader schools had higher pass rates on the Texas Assessment of Academic Skills (TAAS), not only in reading, but also in math, writing, science, and social studies (School Renaissance Institute 1996a). A comparable study was undertaken in Tennessee with similar results. Students in 500 schools using Accelerated Reader scored one-third to one-half grade higher in all subjects on the state competency test than did students in schools that did not use Accelerated Reader (School Renaissance Institute 1998a).

These findings, although extraordinary, are not without explanation. Students who use Accelerated Reader spend more time reading trade books than students who do not use the program, and the longer students use Accelerated Reader, the more they read. Data gathered during the 1994–1995 school year showed that students in schools that used Accelerated Reader for one year or less averaged less than 10 minutes of reading practice per day. Meanwhile, students who used Accelerated Reader for four or more years averaged more than 28 minutes of reading practice each day (School Renaissance Institute 1996b).

Both the experiences of teachers and large-scale research studies indicate that the quantity of reading practice is one of the principal correlates of reading achievement. This fact was supported by the results of the National Assessment of Educational Progress, which was released in February 1999 (National Center for Education Statistics). The report stated the following:

> In 1998, at all three grades [4, 8, and 12] assessed, students who reported reading more pages daily in school and for homework had higher average scale scores than students who reported reading fewer pages daily. The 1998 results indicate that students in grades 8 and 12 are reading more pages each day for school and for homework than in 1994.

Closely related to reading volume is the principle that students' reading will improve markedly when they are matched with books at the appropriate level of difficulty. The zone of proximal development (ZPD) is a theoretical concept inspired by Russian psychologist Lev Vygotsky (Vygotsky 1978). Vygotsky said that those acquiring language concepts will learn most effectively if the concepts are not too easy, yet not beyond their "language ceiling" or limit to language-learning potential. In literature-based reading, ZPD is the range of book readability levels that will result in optimal growth in reading ability. Students who read books within this zone show optimal reading growth because they are reading books that are challenging, but not frustrating. Books that are too easy prevent students from building the vocabulary and comprehension

abilities required to become proficient readers, while books that are too hard frustrate students and cause their reading volume to decrease. Accelerated Reader provides teachers with the information they need to appropriately place students within their ZPD. Teachers and librarians have found the concept of ZPD to be a beneficial tool for matching book levels to individual students' reading abilities (School Renaissance Institute 1998b).

The management of reading practice requires collecting quality information on student reading behavior and reporting it to teachers. Armed with quality information on pass rates, percent correct, points, and book levels, teachers can ensure success with interesting books within a student's zone of proximal development. Quality information in turn depends on quality assessments. Quality assessments are at the heart of all learning information systems. This paper explains the research and logic underpinning the three assessments in Accelerated Reader: Reading Practice Quizzes (including Spanish and Recorded-Voice Quizzes), Other Reading Quizzes, and Literacy Skills Tests. The careful design of these three assessments explains the success and power of the Accelerated Reader learning information system.

Accelerated Reader Assessments

Reading Practice Quizzes

The most well-known type of Accelerated Reader assessment is the Reading Practice Quiz. They are called Reading Practice Quizzes because the purpose of the assessment is to provide quality information for both the management and motivation of reading practice. Reading Practice Quizzes are intended to determine whether or not a student has read a book. These quizzes are encouraging rather than intimidating, chiefly because a student who has read a book should be able to pass the quiz. Questions typically focus on significant events, characters, and literary features of a book. In addition, questions are presented in an order that matches the chronology of a book, a practice that reinforces the story grammar as a student takes a quiz.

The Reading Practice Quiz matches the purpose for which it is intended. It incorporates multiple-choice items that focus on literal understanding because this is the most appropriate way to motivate students and determine if they have read a book. Selecting this type of assessment is consistent with Stiggins' (1997) recommendation that:

> Our goal in assessment design is to use the most powerful assessment option we can. Power derives from the efficiency with which a method can represent our valued target. We always want the highest-resolution picture of that valued target we can get using the smallest possible sample of student performance . . . For this reason, when the target is knowledge mastery, selected response formats fit nicely into the resource realities of most classrooms.

Occasionally, Accelerated Reader Reading Practice Quizzes are criticized as being "lower-level" thinking, a criticism that is unjust for several reasons:

- Literal comprehension has an important place in education. Stiggins (1997) has argued that "the common practice of differentiating between higher- and lower-order thinking is dangerous. When we differentiate in this manner, unfortunately, the honor of being labeled 'lower-order thinking' always goes to the mastery and understanding of *knowledge*, of content. As a result, students come to see this kind of achievement as unimportant. . . ."

- Higher-order skills often reflect students' backgrounds rather than their achievement. Jim Popham (1999), a nationally recognized assessment specialist, has asserted that "items that primarily measure differences in students' inborn intellectual abilities obviously do not contribute to valid inferences about 'how well children have been taught.'" He adds that items that attempt to measure students' ability to "figure out" what the right answer is measure what students come to school with, not what they learn there.

- By focusing on literal comprehension, Reading Practice Quizzes are less subject to bias. If the quizzes required more higher-order thinking skills, students in whom those skills are already well developed would score higher than students who are not so advantaged. Therefore, because Reading Practice Quizzes are primarily based on literal comprehension, all students who read the book and understand it at a basic level receive the same score.

Reading Practice Quizzes are accessible to a broader range of students with the addition of Spanish quizzes and Recorded-Voice Quizzes. Recorded-Voice Quizzes are read by professional narrators and allow preliterate and emergent readers to take the same quizzes as independent readers without extra assistance from the teacher. This enables students to take quizzes on all books that they read independently, books that they read with an adult or peer tutor, and books that were read to them.

Other Reading Quizzes

Other Reading Quizzes enable teachers to monitor aspects of classroom reading—reading instruction assignments from textbooks and reading assignments from magazines. Aligned quizzes are available for a variety of textbooks including series published by Macmillan/McGraw-Hill, Houghton Mifflin, Harcourt, and Scott Foresman. Like Reading Practice Quizzes on trade books, Other Reading Quizzes follow the order of the text and assess literal comprehension using a multiple choice format.

Literacy Skills Tests

In response to teachers' requests, Literacy Skills Tests were developed for some of the books in the Accelerated Reader database. Literacy Skills Tests extend the effectiveness of Accelerated Reader, make it consistent with standards-based education, and help identify students' reading weaknesses.

Currently, Literacy Skills Tests are available for the most popular titles in the Accelerated Reader database. Many of these books are considered classics, such as *Charlotte's Web*, A *Farewell to Arms*, and *Macbeth*. Literacy Skills Test items are based on 24 specific higher-order reading comprehension skills from state standards, basal reading series, and standardized tests. The skills are grouped into four categories so that diagnostic reports can be generated to give teachers an accurate picture of students' reading strengths and weaknesses. Examples of the kinds of skills tested are inferential reasoning, main idea, cause and effect, characterization, and recognizing plot.

Questions on the Literacy Skills Tests are randomly generated from a 36- to 60-item bank. The item-bank approach is appropriate for testing literacy skills, because there is ample content in the books for which the tests have been developed. In addition, the tests are not intended as a motivational tool, but rather as an instrument to diagnose students' strengths and weaknesses. As a supplemental option to Reading Practice Quizzes, Literacy Skills Tests may be administered to students for various reasons, such as test preparation or to assess a deeper understanding of a book. The best time to use Literacy Skills Tests is after students take the Reading Practice Quiz for the book.

Important Considerations in Assessment

Principles of Assessment

Reading Practice Quizzes conform closely to the most widely accepted principles of assessment. Most obviously, the quizzes are valid because they are tied directly to the content of a specific book and focus on facts rather than conjecture. The results of extensive analyses of student performance with Accelerated Reader suggest that students who read the book do well on the quiz (for multiple choice item guidelines see Frary 1995).

By doing well on a quiz, students are motivated to read additional books and take the corresponding quizzes. This tendency is consistent with the observations of Black and Wiliam (1998) that students respond more favorably when they can

establish their own goals and are presented with "a meaningful, interesting, and reasonably demanding challenge."

In two respects, Accelerated Reader quizzes are standardized. First, they fit the definition of standardized given by Popham (1999): they are "administered and scored in a predetermined, standard manner." This characteristic is important because it ensures that the quizzes are fair. Even though Accelerated Reader is considered low-stakes formative assessment, both students and teachers invest much of themselves in the program, and the perception of fairness contributes importantly to the widespread acceptance of Accelerated Reader.

Second, the development and administration of Accelerated Reader Reading Practice Quizzes means the information they provide is comparable over time and from student to student. The Accelerated Reader system assigns a point value to each book based on the number of words in the book and its reading level, using the ATOS Readability Formula for Books (School Renaissance Institute 2000). After reading a book, a student goes to the computer and takes a quiz. Students must score at least 60 percent on 5- and 10-question quizzes and 70 percent on 20-question quizzes to earn any points. The points are an accurate measure of the amount of words being read and comprehended, and therefore a precise quantitative measurement of reading practice (School Renaissance Institute 1996b). Teachers can be confident that the reports generated by Accelerated Reader are accurate, are based on valid data, and can truly help plan effective instructional interventions.

Selected-response assessments like Accelerated Reader Reading Practice Quizzes are efficient in that they provide a high degree of useful information while consuming relatively little time. Stiggins (1997) argues that "selected-response assessment is versatile . . . In the classroom, where one important goal is to help students master the knowledge and thinking foundations of competence, the accurate and efficient assessment of that mastery can be a key to student growth and development."

Cheating and Related Issues

For the most part, teachers report that cheating is not a significant problem on Reading Practice Quizzes. Teachers indicate that students enjoy reading books they have chosen, feel confident about taking quizzes, and recognize that Accelerated Reader quizzes are non-threatening assessments.

Students normally feel there is little reason to cheat on an Accelerated Reader quiz for two reasons. First, there are typically no negative consequences associated with failing a Reading Practice Quiz; and second, if a student has read a book, chances are that she will answer most of the questions correctly. Experience suggests that students believe the purpose of the quiz is to help them improve their reading, and thus there is no reason for them to cheat.

Reading Practice Quizzes discourage casual cheating (e.g., students sharing correct answer choices) by changing the order of the answer choices for each student. When students take a Reading Practice Quiz, the answer choices are presented in random order. This level of security has proven successful and is consistent with the purposes of the Reading Practice Quizzes. Further, in the typical Accelerated Reader classroom, students are all reading different books, and take a quiz only once. Therefore, it is unlikely that they will be sufficiently familiar with a quiz to provide useful information to another student.

Some educators suggest that using an item bank for Reading Practice Quizzes will stop whatever cheating may occur. However, for reading practice, item banks have several major shortcomings and may even encourage cheating. These shortcomings reflect the thinking of experts in the field (Rudner 1998).

- When questions are drawn from an item bank, different students are given different quizzes, so the question of fairness arises because some quizzes will be more difficult than others. This perception of unfairness may actually be demotivating and discourage students from reading.

- Frequently, there is not enough content in a book to create meaningful questions in an item bank. Attention to picky details that are unimportant to the story grammar could cause frustration for students. Questions of this difficulty level may discourage students from reading, thus making it more likely they will resort to cheating.

- In an effort to compile a bank of items, questions may have to be written so simplistically as to be trivial. That lowers the levels of challenge, and students may believe the tests can be passed without reading a book. It is nearly impossible to create equivalent forms of reading practice tests. Without equivalency, no two quizzes are the same, and the information collected is neither comparable between students nor reliable.

Essentially, item banks for reading practice assessments reduce the amount of quality information collected, reduce motivation, and fail to stop the primary way in which students typically cheat— a student who has read a book takes a test in another student's name. The only reliable method to stop cheating is to monitor the assessment process.

Retaking Quizzes

As a rule, students should not take a Reading Practice or Other Reading Quiz more than once. If students have read a book within their zone of proximal development (ZPD), they are likely to pass the quiz because of the way it has been designed. If a student does not pass a quiz, it is probably because the student has not read the book or the book was too difficult in the first place. In neither case does it make sense for the student to retake the quiz.

STAR Reading Computer-Adaptive Reading Test

In addition to the Literacy Skills component of Accelerated Reader, an item bank is featured in another program from Renaissance Learning, STAR Reading computer-adaptive reading test. This program is a norm-referenced assessment that provides an accurate measure of students' reading comprehension in less than 10 minutes. The results of STAR Reading are highly correlated with traditional standardized tests, but unlike these lengthy, high-stakes assessments, STAR Reading can be administered several times a year in order to identify the reading level for a student or predict the student's performance on a high-stakes test.

STAR Reading includes a bank of 50 to 60 vocabulary-in-context items at each level. When students take the test, they begin with an item at the low end of their ability level. As they answer questions correctly, the computer presents more difficult items. When a student makes an error, the computer presents a less difficult item. This Adaptive Branching testing method is both efficient and powerful because it produces valid and reliable results in one-fifth the time of a traditional standardized test.

This application of a bank of items is appropriate because each item has been calibrated and tested on a national standardization sample. Teachers and students who use the program can be confident that the assessment is fair because each assessment generated for students of comparable abilities is equivalent. Moreover, the program can create five or six unique "forms" so the same student can be tested often without encountering the same item twice.

Occasionally, there may be extenuating circumstances that contribute to a student's failing a quiz. These circumstances include disruptions, illness, personal situations, and such. When this is the case, the teacher has the option of negating the student's score and allowing the student to retake the quiz.

Retaking the identical quiz typically increases students' scores but is perceived by some parents as being unfair (Snow 1993). The tendency to score better increases when students receive feedback about whether their answers are right or wrong. Given this tendency, one might question the purpose of allowing students to retake a test, or more specifically, to retake a Reading Practice Quiz that is meant to determine if a student has read a book.

In essence, the regular retaking of quizzes may cause cheating. Allowing students to retake a Reading Practice Quiz on a regular basis promotes guessing and leads students to choose books that are too difficult for them. In fact, allowing students to take a quiz more than once may cause some students to take quizzes on books they haven't read because they have a good chance of passing the quiz after taking it several times.

Literacy Skills Tests that are part of Accelerated Reader are an exception to this recommendation about the retaking of quizzes. These tests are based on an item bank correlated to specific comprehension skills. The purpose of Literacy Skills Tests is to measure various aspects of comprehension, and they are not intended primarily to motivate students. Teachers may choose to have students retake Literacy Skills Tests in order to provide additional practice or to assess specific elements of comprehension, such as inferential comprehension. Also, Literacy Skills Tests can be useful for diagnostic purposes, to measure the change in students' skills after an intervention, or to determine if students have mastered one or more skills. For these purposes, item-bank technology is appropriate because equivalent forms of the assessment can be generated within a skill category, such as constructing meaning.

Consistent Parameters

Because Accelerated Reader is a management system that provides teachers with instructionally relevant information, it has certain fixed parameters to ensure fairness and consistency. The number of questions on a given quiz, for example, reflects the attention span and cognitive level of the student taking it as well as the length of the book and the depth of its content. Short books written for first- and second-graders have five-question quizzes, while classics intended for mature readers have 20-question quizzes. The majority of books fall between these two categories and have 10-question quizzes.

In order to maintain fairness and consistency, Accelerated Reader doesn't allow the teacher the option of assigning point values or changing the number of questions required to pass a quiz. This approach would render the information collected meaningless because data are not comparable from student to student. In addition, the approach is arbitrary and might be perceived by students as being unfair, which is demotivating.

In addition to having consistent assessment rules, Accelerated Reader allows students to earn a portion of the points assigned to a book, depending upon their quiz performance. This practice is consistent with the typical grading method used by teachers. When students take a teacher-designed classroom test, they typically don't get a zero or 100; they receive a numeric score that indicates the portion of the questions they have answered correctly. This practice has proven successful over the years and is supported by countless teachers, which is why it has been incorporated into Accelerated Reader.

Summary and Conclusions

Accelerated Reader is a learning information system that provides teachers with quality information needed to develop appropriate intervention strategies to improve students' reading abilities. This feedback allows teachers to determine how much students are reading, whether they are reading books at the appropriate level of difficulty, and if they understand what they are reading. The quality and quantity of the data provided by Accelerated Reader overcome one of the most significant problems in education—a lack of meaningful information. Goodlad (1984) described this problem in his classic work, *A Place Called School*, in which he asserts that "there is a paucity of praise and correction of students' performance, as well as of teacher guidance in how to do better next time."

The three types of assessment that are part of Accelerated Reader are educationally sound and provide teachers with relevant information that can guide instruction. Reading Practice Quizzes contain a fixed number of questions and determine if a student has read a book; they also motivate additional reading. Other Reading Quizzes help teachers monitor students' reading instruction assignments. Literacy Skills Tests contain questions that have been drawn from an item bank and are meant to assess a broad range of comprehension skills. These latter assessments are ideal for diagnosing students' strengths or weaknesses and for determining mastery.

The combination of a large database of sensibly constructed Reading Practice Quizzes, now numbering nearly 50,000, has made Accelerated Reader the most popular educational software in America's schools. An extensive body of research supports its effectiveness, and ongoing research ensures that the program continues to enhance teachers' efforts. There is no doubt that Accelerated Reader helps teachers promote the use of authentic literature, practice outstanding classroom management, and create the positive affective climate that is the hallmark of an effective classroom.

Works Cited

Black, P., and D. Wiliam. "Assessment and Classroom Learning." *Assessment in Education: Principles, Policy, & Practice 5*, no. 1 (1998): 7–74.

Frary, R.B. *More Multiple-Choice Item Writing Do's and Don'ts*. Washington, DC: ERIC Clearinghouse on Assessment and Evaluation, the Catholic University of America, Department of Education, 1995. ERIC Document Reproduction Service No. ED 398238.

Goodlad, J. *A Place Called School: Prospects for the Future*. New York: McGraw-Hill, 1984.

National Center for Education Statistics. *NAEP 1998 Reading Report Card for the Nation*. Washington, D.C.: U.S. Department of Education, 1999.

Popham, J. "Why Standardized Tests Don't Measure Educational Quality." *Educational Leadership* 56 (1999).

Rudner, L. *Item Banking*. Maryland: ERIC Clearinghouse on Assessment and Evaluation, University of Maryland, 1998. Summary Available online: <http://www.edrs.com>. ERIC Document Reproduction Service No. ED 423310.

School Renaissance Institute (formerly Institute for Academic Excellence). *Impact of Accelerated Reader on Overall Academic Achievement and School Attendance*. Madison: Institute for Academic Excellence, 1996a.

———. *Patterns of Reading Practice*. Madison: Institute for Academic Excellence, 1996b.

———. *Learning Information System Effects on Reading, Language Arts, Math, Science, and Social Studies*. Madison: Institute for Academic Excellence, 1998a.

———. *ZPD Guidelines: Helping Students Achieve Optimum Reading Growth*. Madison: Institute for Academic Excellence, 1998b.

———. *ATOS Readability Formula for Books and How It Compares to Other Formulas*. Madison: School Renaissance Institute, 2000.

Snow, W.M. *The Effects of Repetitive Assessments on Academic Achievement and Pupil Self-esteem*. Summary Available online: <http://www.edrs.com>. ERIC Document Reproduction Service No. ED 362565, 1993.

Stiggins, R.J. *Student-Centered Classroom Assessment*. 2nd ed. Upper Saddle River, N.J.: Prentice-Hall, Inc., 1997.

Vygotsky, L.S. *Mind In Society: The Development of Higher Psychological Processes*. Cambridge: Harvard University Press, 1978.

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