Fluency:
Achieving True Mastery in the Learning Process

Carl Binder
Binder Riha Associates

Elizabeth Haughton
Haughton Learning Center

Barbara Bateman
University of Oregon

Fluency: Achieving True Mastery in the Learning Process

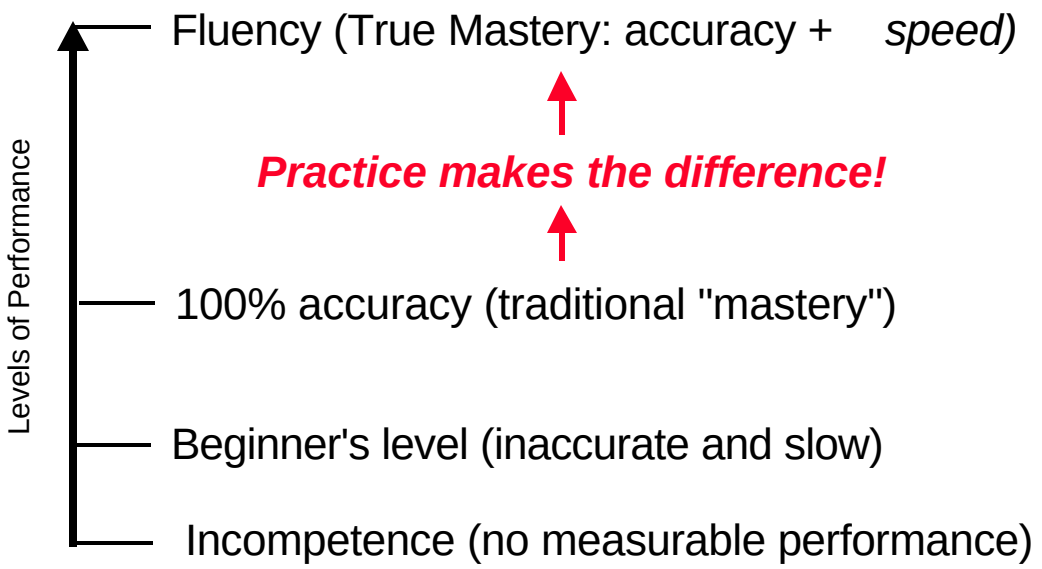
How can you tell whether someone has truly mastered a skill? What is the measurable indicator that a person really knows how to do something? These questions should be at the heart of every teaching decision, every observation of a child's performance, and every evaluation we make about the success of an educational program. Yet for many educators, and certainly for most parents, answers to these questions are anything but clear. Most of us have grown up in a "percentage correct world" where 100% correct is the best anyone can do. But is perfect accuracy the definition of mastery? Or is there another dimension that makes the difference? In fact, we see many children and adults who can perform skills and demonstrate knowledge *accurately* enough – given unlimited time to do so. But the real difference that we see in expert performers is that they behave *fluently* – both accurately and quickly, *without hesitation*.

What Is Fluency?

We all know fluency when we see it in a foreign language speaker. We say, "She spoke fluent Italian" when we observe a person speaking Italian smoothly, quickly, and without hesitation. It's not just about saying the correct words. It's also about achieving a useful pace or speed of performance. We have little difficulty recognizing a masterful athletic or musical performance. Carlos Santana, Chris Evert, Michael Jordan, Celine Dion, Tiger Woods, Ray Charles, Bonnie Raitt – they all have at least one thing in common: performances that are undeniably *fluent*. They all make the right moves without hesitation. They perform with the appropriate combination of accuracy plus speed (or quality plus pace.) Even in people who are less well known than these World-Class performers, we recognize fluency as the hallmark of competence. Skilled computer users, mental mathematicians, or expressive readers share that combination of getting it right with ease and fluidity that characterizes all genuinely accomplished people.

Fluency goes beyond mere accuracy to include the pace, or speed of performance. On a continuum from a total lack of measurable performance to mastery, 100% correct is only part of the way there.

For copies, go to http://curry.edschool.virginia.edu/go/specialed/papers/ and select the link to Binder-et-al_Fluency.pdf.



Can you demonstrate how it looks to perform at 75% correct? Can you visualize a 90% correct performance? The answer is "No.". That is because with a percentage correct score, we don't know how many opportunities there were for responding (was it 10, 20, 100?). And we can't tell how much time was required to complete the work (was it 10 seconds, 1 minute, 10 minutes?). Therefore, we cannot possibly demonstrate or imitate the performance because a percentage correct score lacks the time-based information that would allow us to duplicate it.

This lack of essential information built into percentage correct evaluation is at the heart of many educational failures. Since most educational assessment uses accuracy-only, it cannot show any difference between accurate but struggling performance, and fluent performance. Without measuring time, neither teachers nor learners can set fluency goals or precisely monitor progress toward those goals. It's no wonder, then, that students in many educational programs often fail to achieve fluency. Instead, they progress by building one non-fluent skill on top of another until the whole skill set becomes "top heavy" and falls apart. For example, when in *your* educational career did mathematics become difficult? For most people math at some point became too unpleasant to pursue further because its foundation contained too many skills that were not fluent and were therefore difficult to apply. The result of piling too many non-fluent skills on top of one another is emotional stress, a sense of being overloaded, lack of attention span, and in extreme cases dropping out from school.

Why Is Fluency Essential?

If you carefully observe children in the learning process, it is easy to understand why behavioral fluency is an essential success factor in learning and performance of any kind. Both informal experience and scientific research (e.g., Binder, 1996; Wolf, 2001) suggest that fluency contributes directly to three types of critical learning outcomes:

- **Retention and maintenance**: the ability to perform a skill or recall knowledge long after formal learning programs have ended, without re-teaching in school year after year
- **Endurance:** the ability to maintain performance levels and attention to task for extended time periods while resisting distraction, and
- **Application:** the ability to combine and apply what is learned to perform more complex skills, creatively, and in new situations.

These are important outcomes that education is supposed to accomplish, but which are sadly lacking in the long-term results of many educational programs. Parents usually see the lack of these outcomes as symptoms, or problems that arise at homework time and when children try to apply what they've learned in school to life situations. Even in relatively successful students, who do not falter in obvious ways, a lack of fluency in essential skills and knowledge can seriously limit their ability to achieve the full learning potential of which they are capable.

Consider the difference between a student who easily completes her homework and another student who avoids homework, completes it with difficulty, and seems unusually distractible. *The most obvious difference is a lack of fluency in the second child.* For example, on arithmetic "story problems" (dreaded by many students, teachers, and parents!) the more successful student is able to read problems rapidly and correctly, calculate answers to basic math problems quickly and accurately, and complete other parts of the problem with relative ease. The struggling student, in contrast, falters while reading the problem, performs basic math with hesitation (perhaps counting fingers to compute basic sums), and may guess which phrases (such as "how many left") indicate specific types of calculations. When students lack fluency in the foundation skills, performance requiring application of those skills is likely to be painfully slow, difficult, and full of errors. Fluency should be an essential

criterion at each step in an educational program because it allows students to progress smoothly through the learning process, building each successive layer on a previous layer of fluent prerequisite skills and knowledge.

Another way to understand the effects of fluency, or "automaticity" (Bloom, 1986), is that it frees up attention for higher order application rather than overloading attention with the mechanics of performance. Fluency in foundation skills frees attention for application, creativity, and problem-solving – the higher-order activities that make education valuable and fun. Parents usually comment that students with fluent foundation skills do their homework independently and enjoy new challenges. Teachers say that these students are a joy to teach and seem to love learning. On the other hand, when students struggle to form letters or digits they have less attention for composition, calculation, or creativity. When they aren't fluent on basic math facts, they have a hard time paying attention to the teacher's demonstration of long division or adding fractions. When students can't read fluently, there's little attention for remembering, comprehending, or enjoying a story or essay.

Many of these struggling students are in special education. Most will achieve fluency only with supervised and frequent practice. Too often with these students, mastery to a given level of accuracy is the only goal. When that level is reached, or even before it is reached, the student is typically moved along immediately to new, more difficult material and never achieves fluency in the most basic skills. While the amount of work required and the level of expectation both increase, the student remains mired down, slowly and painfully logging along, falling further behind and becoming more discouraged. Completing class assignments and homework becomes an impossibility. And fluency is never achieved.

Increased emphasis in special education on helping students achieve true fluency in all foundation skills before moving ahead would benefit not only the students, but also their teachers and parents. Central to every special education student's schooling is his or her Individualized Education Program (IEP). Using fluency aims as the mandated measurable goals and objectives would greatly increase the usefulness of IEPs, making them far faster and easier to prepare and facilitating clear, honest, objective progress reporting to parents. Visible, explicit fluency aims would also lead to interventions focused on achieving essential levels of both speed and accuracy, i.e., on becoming fluent.

How Do We Measure Fluency?

While the term "fluency" has been used with more and more frequency in publications about reading and mathematics in recent years, many or even most descriptions of fluency are qualitative but not precisely quantitative. Authors use words and phrases such as *smooth, fluid,* rhythmic, *having a good cadence,* and *without hesitation* to describe fluency. They contrast fluency with performances described as *jerky, hesitant, choppy, containing extended pauses*, and *lacking appropriate phrasing*. But specific measures are lacking in many academic discussions of fluency.

The easiest way to measure fluency in most skills is to select a repeatable action such as saying a word or writing the answer to a math problem, and to count how many times a person can complete that action in a fixed period of time. An educational methodology known as Precision Teaching (Binder, 1988; Binder and Watkins, 1990) has identified ranges of count per minute performance describing fluency for hundreds of academic skills. By specifying a range of count per minute of correct responses on specific types of materials and procedures, it is possible to set goals for practice that help both teachers and learners make timely decisions to change or modify educational programs with individual learners.

Sometimes we might time the student for ten seconds, and sometimes two minutes. But for the sake of comparison, we always do the simple math to reduce our measures to *count per minute*. We often keep track of multiple counts at the same time, such as correct, incorrect, and self-corrected responses. Our goal is for learners to achieve a certain range of correct responses per minute, and to reduce or eliminate errors, skips, hesitations, or responses that require added help. We start all timings with a respectful, but clear instruction, "Please begin," and we end with "Please stop."

It's easy to find out how quickly and accurately skilled people are able to perform. As an example, ask a small group of literate adults to copy a passage of text as rapidly as they can for a minute. Most of them will probably be able to copy between 100 and 150 letters in that time period. Similarly, being able to write correct answers to printed addition problems (e.g., 3 + 4 =) at between 70 and 110 per minute, or reading a passage of text aloud at between 150 and 200 per minute, each represents fluent performance.

Once we decide what to count, we set "aims" (Haughton, 1972; Binder, 1996) or performance criteria that serve as practice goals, and we conduct daily timings to monitor progress towards the aims. We use these measures to make decisions about whether to change learning programs – either because students have achieved their aims, or because they are not improving and need an intervention to accelerate learning. Passing students on to harder curriculum when they are below fluency aims negatively affects self-confidence and attitude as well as reducing the chance that they will be able to retain or apply the skill. Millions of students each year fail to achieve fluency on basic skills and require later re-teaching on the same skills. This is a terrible waste of students' and teachers' precious time. Reaching fluency the first time supports steady, rapid progress through curriculum, without allowing students to fall back.

Achievement Gains From Building Fluency

When we pinpoint key skills, set fluency aims for each, and combine teaching and practice with measurement to help students achieve those aims, educational programs (whether school-based or home-based) often produce dramatic improvements in academic achievement. In an early demonstration program during the 1970's (Beck, 1979), adding just 20 to 30 minutes per day of practice, measurement, and charting of basic skill components to an otherwise ordinary elementary school curriculum increased children's standard test scores by 20 to 40 percentile points, compared with other students in the same district. More recently, fluency-based instructional programs have reliably produced multiple grade levels of improvement in a summer program among students diagnosed with "learning problems" (Johnson and Layng, 1992). In addition, fluency-based programs have markedly improved students' ability to maintain attention to task while working on a variety of different activities (Binder, Haughton, and Van Eyk, 1990).

Selected Fluency Ranges

Since the late 1960's, Precision Teaching practitioners have been developing and refining estimated fluency standards for a wide range of skills, based on observation of thousands of students and how they have been able to perform after achieving (or not achieving) specific performance levels.

We generally specify *fluency ranges* of count per minute performance to account for individual differences and to recognize the fact that fluency for a particular skill is not a single, precisely defined level but a *band* on the spectrum of all possible performance levels within which most learners seem to retain and maintain skills, perform over extended durations without undue distractibility, and apply what they learn to more complex types of performance. This is not an exact science, and there are differences in opinion among practitioners about what levels are absolutely necessary for optimal results. On the other hand, most practitioners who are experienced with measuring count per minute performance can confidently report levels that are not sufficient to support optimal performance, whether or not they agree on the exact parameters of specific fluency ranges.

Here are some widely accepted estimates of fluent performance on a range of basic skills. All estimates are correct responses per minute, and presume zero or near-zero error frequencies. We have included grade-level aims for oral reading – ranges that represent good progress toward fluency for students of a given age – to reflect the fact that achieving fluency in some skills might require systematic progress over several years' time, depending on development of oral, fine motor, or other component skills. In addition, we have followed the convention of listing the higher limit of each fluency range *first* to encourage both students and teachers practice beyond achieving the bare minimum of the fluency range.

Oral Reading	**Grade Level Aim**	**Fluency Estimate**
Read words orally from a passage (see/say)		200 – 180 words/min
1st Grade	100 - 60 words/min	
2nd – 3rd Grades	120 - 100 words/min	
4th – 5th Grades	150 – 120 words/min	
6th – 8th Grades	180 – 150 words/min	
9th Grade and above	200 – 180 words/min	

Reading Recall	
Recall and say information in sequence after reading a story (free/say)	60 - 40 ideas/min
Recall and write summary after reading a story (free/write)	20 -10 words/min

Rapid Naming

Name objects from a picture (see/say)	80 - 60 words/min
Name objects presented on cards (see/say)	60 - 40 words/min
Name objects in the room (see/say)	60 – 50 words/min
Read letters from a worksheet (see/say)	150 – 120 letters/min

Phonemic Awareness

Blend sounds to form words (hear/say)	12 – 10 / min
Segment words into sounds moving colored blocks to mark sounds (hear-do/say)	50-40 sounds /min
Make new words by substituting one phoneme for another (hear/say)	20 – 15 / min

Phonics

Read consonants and vowel sounds (see/say)	120 – 80 /min
Read nonsense words (see/say)	120 – 100 / min
Read real words (see/say)	130 – 100 / min

Basic Arithmetic

Count by 1's, 2's, 5's, and 10's (free/say)	120 – 100 /min
Read numbers (see/say)	150 – 120 / min
Write numbers 0-9 repeatedly (free/write)	120 – 100 / min
Say or write answers to basic +, -, x, and / facts (see/write, see/say)	100-70 /min

Handwriting and Typing

Write straight marks (free/write)	300 - 250 / min
Write curved marks (free/write)	200 - 150 / min
Write letters (free/write)	120 - 80 / min
Copy words or numbers from paper or board (see/write)	120 - 80 chars/min
Typing using a keyboard	90 – 60 chars /min

Spelling

Write words from dictation (hear/write)	15 – 10 words /min
Write words in a category (free/write)	15 – 10 words / min

Curriculum materials published with fluency aims for each skill represent the leading edge of teaching effectiveness to the extent those aims have been developed based on results obtained with large numbers of students. Some available programs of this type that are listed at the end of this article.

How Can We Help Students to Achieve Fluency?

Practice is the key to any fluency-based program. Athletes and performing artists have always been aware that focused repetition of important skills is the necessary prerequisite for achieving great performance. Sad to say, however, many educators may not realize this basic principle of skill development. Even for those who understand the value of practice, it's important to focus on *the right kind* of practice to produce the greatest gains rather than on practice routines that are boring, painful, and ultimately ineffective. Some of the important differences between effective and ineffective practice programs include the following:

Efficient practice always has a goal. Athletes are always striving to achieve goals, often motivated by attaining their "personal best" performances. Similarly, students who have count per minute goals for reading, writing, math, and other types of skills are generally more motivated than those told simply to "practice until you get better." As Dante, a student, said, "Without a practice aim, you're aimless!"

It's easier to attain fluency on small, achievable" chunks" or components of a larger performance than to attain mastery of the whole thing at once. This is perhaps the most important discovery of fluency-based educators (e.g., Starlin, 1971: Haughton, 1972). When students lack fluency in writing letters and digits, decoding words, saying vowel sounds, or calculating answers to basic arithmetic problems, they often have great difficulty combining those skills into larger chunks. One of the most important ways to achieve fluency on anything is to find a way to practice and first master its smaller elements.

For students who have not yet achieved fluency, practice for short intervals is generally more productive than practice for longer continuous time periods. Demonstrate this for yourself by first writing by 5's forward for 2 or 3 minutes (5, 10, 15.....). Then write by 7's backwards from 300 (300, 293, 286....) for the same amount of time. You will find that writing backward by 7's is more difficult and that you will have a harder time maintaining attention or a steady performance than when writing forward by 5's. The general finding (Binder, Haughton, and VanEyk, 1990) is that students gain

greater progress, and confidence, if you encourage them to practice for very short time periods (e.g., 15 or 30 seconds) until they achieve fluency ranges, and only then begin to lengthen the practice timings to one minute and beyond, working toward the same aims for the longer timings.

Practice every day and keep a graphic record of learning progress on each specific type of skill. Precision Teaching, an instructional measurement and decision-making approach developed by Dr. Ogden Lindsley (1990) and his colleagues during the 1960's, is the best way to manage learning and to make data-based decisions. If students learn to measure and chart their own daily practice, and to make program changes when progress "goes flat" on the chart, they will soon discover for themselves what works best for them. (For a great reference to Precision Teaching on the Web, see http://server.bmod.athabascau.ca/html/387/Modules/Lindsley/introa.html.)

When performance shows little or no improvement and is below the aim, try working on a simpler task. Sometimes the problem is that key skills are not fluent (e.g., non-fluent digit-writing slows down writing answers). In that case, stepping back to practice the component skills can often lead to progress. Working on a smaller set of items (e.g., ten words on a spelling list rather than 20) can often accelerate performance. Separating out difficult items from a given chunk of material (e.g., writing certain letters or numbers that are difficult) and working extra on them, usually makes a difference. Shifting between fast practice and practice for *quality* (e.g., on handwriting) can sometimes break the logjam between quality and speed. Many other forms of "divide and conquer" can help as students measure their performance and decide how to improve it. Most important is not to move ahead to more challenging skills when the basic foundation is not fluent.

Conclusion

With what we now know about fluency in all areas of academic performance – not merely reading, typing or other "speed" skills – it is certainly possible to help children learn faster than ever before. By including the time dimension (count per minute) in our measurement methods, and systematically making changes with fluency as our goal, we can help students achieve levels of truly masterful performance in reading, writing, and arithmetic, in the same way that excellent coaches and performing arts teachers develop athletes, musicians and dancers. In the end, it is simply *paying*

attention to fluency that will make the difference: throwing off the blinders imposed by traditional percentage correct assessment systems and seeing mastery for what it is: the demonstrably useful combination of accuracy plus speed of performance. Or, simply stated, *fluency is true mastery*.

Annotated References

The following reference list is by no means complete, nor does it include all seminal or critical publications on the topic of fluency in education. For further depth, review reference lists in these publications or use the terms "fluency" or "automaticity" to search for more information.

Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Urbana-Champaign, IL: Center for the Study of Reading. This book is one of the most referenced books on the essentials of reading, including the importance of fluent decoding.

Beck, R. (1979). *Report for the Office of Education joint dissemination review panel*. Great Falls, Montana: Precision Teaching Project. The Sacajawea Project in Great Falls, Montana, demonstrated that 20 to 30 minutes of timed and charted fluency practice on basic skill components per day could increase an entire school's achievement sub-test scores by 20-40 percentile points, compared with other schools in the district.

Binder, C. (1988). Precision Teaching: Measuring and attaining exemplary academic achievement. *Youth Policy Journal*, 10(7), 12-15. Available at http://www.binder-riha.com/publications.htm.

Binder, C., (1996). Behavioral fluency: Evolution of a new paradigm. *The Behavior Analyst*, 19, 163-197. This article recounts the conceptual and historical developments that led to current practice of fluency-based instruction using Precision Teaching methods. Available at http://www.binder-riha.com/publications.htm.

Binder, C., Haughton, E., & Van Eyk, D. (1990). Increasing endurance by building fluency: Precision teaching attention span. *Teaching Exceptional Children*, 22(3), 24-27. Many cases of apparent attention deficit can be successfully addressed by building fluency in practice intervals as brief as 10 or 15 seconds, and then gradually increasing practice duration. Available at http://www.binder-riha.com/publications.htm.

Binder, C., & Watkins, C. L. (1990). Precision teaching and direct instruction: Measurably superior instructional technology in schools. *Performance Improvement Quarterly,* 3(4), 74-96. This article provides a review of Precision Teaching principles and methods in a publication that is read by academic and corporate instructional designers and performance improvement specialists. Available at http://www.binder-riha.com/publications.htm.

Bloom, B. S. (1986, February). The hands and feet of genius: Automaticity. *Educational Leadership*, 70-77. Benjamin Bloom simply equates automaticity, or fluency, with mastery.

Dowhower, S. L. (1989). Repeated reading: Research into practice. *The Reading Teacher*, 42, 502-507. This article presents the benefits of repeated reading as well as guidelines and classroom suggestions for this proven fluency development method.

Haughton, E. C. (1972). Aims: Growing and sharing. In J. B. Jordan & L. S. Robbins (Eds.), *Let's try doing something else kind of thing* (20-39). Arlington, VA: Council on Exceptional Children. This chapter presented the breakthrough discovery that specific count per minute ranges of performance on "tool skill" components of basic skills should serve as prerequisite criteria for progression through basic skills curriculum.

Johnson, K. R., & Layng, T. V. J. (1992). Breaking the structuralist barrier: Literacy and numeracy with fluency. *American Psychologist*, 47, 1475-1490. This widely cited report of a fluency-based instructional methodology presents a "generative instruction" approach whereby achieving fluency on carefully selected component skills can enable students to perform subsequent skills in the curriculum with little or no explicit instruction.

Kaminski, R.A., & Good III, R.H. (1996). Toward a technology for assessing basic early literacy skills. *School Psychology Review*, 25(2), 215-227. This reviews background information and presents a research study supporting use of Dynamic Indicators of Basic Early Literacy Skills (DIBELS): fluency in phonemic segmentation, letter naming, and picture naming.

Kubina, R.M., & Morrison, R.S. (2000). Fluency in education. *Behavior and Social Issues*, 10, 83-99. This review of research and practice in fluency-based instruction describes Precision Teaching as the preferred measurement and instructional decision-making methodology.

Lindsley, O. R. (1990). Precision Teaching: by teachers for children. *Teaching Exceptional Children*, 22(3), 10-15. This article provides a summary account of the evolution of Precision Teaching.

Mercer, C. D., & Mercer (1985). *Teaching students with learning problems (2nd ed.)* Columbus, OH: Charles E. Merrill. This book summarizes a comprehensive survey of fluency standards for reading and math used by a wide community of Precision Teaching practitioners.

Meyer, M.S., & Felton, R. (1999). Repeated reading to enhance fluency: Old approaches and new directions. *Annals of Dyslexia*, 49, 283-306. Summarizes what is known and what needs to be researched about repeated reading methods and their effects.

Scott, J., Wolking, B., Stoutimore, J., & Harris, C. (1990). Challenging reading for students with mild handicaps. *Teaching Exceptional Children*, 22(3), 32-35. This article describes procedures for assessing, monitoring, and building reading performance toward count per minute fluency ranges using challenging reading materials.

Starlin, C. (1971). Evaluating progress toward reading proficiency. In B. Bateman (Ed.), *Learning disorders, vol. 4: Reading*. Seattle, Washington: Special Child Publications. This chapter describes early Precision Teaching efforts to monitor progress toward count per minute fluency standards for reading.

Wolf, M. (Ed.). (2001). *Dyslexia, fluency and the brain*. Timonium, NJ: York Press, Inc. This edited collection of papers covers a broad range of reading fluency research and practice.

Selected Fluency-based Programs and Materials

- *Cyberslate.* This computer-mediated program supports practice in reading, typing, and math. The Learning Incentive, Inc. 139 North Main St., West Hartford, CT 06107 (860) 236-5807 www.cyberslate.com
- *Great Leaps.* Using graded stories and word lists, this program uses repeated reading to develop phonics and reading fluency. Great Leaps P.O. Box 357580 Gainesville, FL 32635 (877) GRL-EAPS www.greatleaps.com
- *Haughton Learning Center.* This Precision Teaching center publishes fluency-based programs in phonemic awareness, handwriting, pre-arithmetic and arithmetic, and other foundation academic skills. Haughton Learning Center 3166 Jefferson St., Napa, CA 94558 (707) 224-8863 www.haughtonlearningcenter.com
- *Morningside Press.* This company's programs in mathematics, expressive writing, reading, and elementary test-taking skills include some packages of fluency materials for use with Englemann's Direct Instruction programs. 1621 12th Ave. Seattle, WA 98122 (206) 329-9412 www.morningsideacademy.org
- *Phonics for Reading.* This series of three workbooks offers practice on sight word recognition, phonetically predictable words and multi-syllable "challenge" words with fluency practice on short passages. Curriculum Associates, Inc. P.O. Box 2001 North Billerica, MA 01862-0901 (800) 225-0248 www.curriculumassociates.com

- *Read Naturally*. Read Naturally, Inc. provides several series of software CDs, books and tapes for repeated reading, including grade level materials, a phonics series, and both multicultural and Spanish programs. Read Naturally, Inc. 750 S. Plaza Drive #318 Saint Paul, MN 55120 (800) 788-4085 www.readnaturally.com
- *Sopris West.* This educational publisher offers a wide variety of products and programs, including the *Basic Skillbuilders* book and materials designed to develop fluency with 1-minute timings on basic skills. Sopris West Educational Services P.O. Box 1809 Longmont, CO 80502-1809 (888) 819-7767 www.sopriswest.com
- *Teach Your Children Well*. QLC Educational Services offers a series of programs in reading and other basic skills that combine the methods of Precision Teaching with scripted Direct Instruction. QLC Educational Services 217 Pinnacle St. P.O. Box 908 Belleville, Ontario Canada K8N 5BC (613) 967-9959 www.teachyourchildrenwell.ca
- *Victory Drill Book.* This book and its associated materials offer phonetically predictable word lists and repeated reading strategies for achieving "high speed" reading. Victory Drill Book, P.O. Box 2935 Castro Valley, CA 94546-0935 (510)537-9404 www.victorydrillbook.com

Authors

Carl Binder, Ph.D., Senior Partner at Binder Riha Associates, began his career as a doctoral student with B.F. Skinner, and spent the 1970's conducting instructional research, training and supervising teachers. During the 1980's and 1990's he applied fluency-based training and coaching methods in corporate settings while continuing work with educators and psychologists, frequently in collaboration with Elizabeth Haughton, in whose first grade classroom he had completed portions of his doctoral dissertation. He now consults with corporations and educational agencies, publishes extensively about fluency-based instruction and performance improvement methods, and speaks passionately to whomever will listen about the huge potential for improving education that exists in a fluency-based approach. Contact him at CarlBinder@aol.com and download his articles from www.binder-riha.com/publications.htm

Elizabeth Haughton, Director of the Haughton Learning Center, has for over thirty years provided children with individual learning success programs. Using the principle of fluency in basic skills and a unique measurement system, called Precision Teaching, students are ensured learning success. She has worked with students from age four to fifty-five years old who struggle with learning in the areas of their visual, auditory, language and motor systems. Elizabeth is a renowned, dedicated professional who can identify a child's strengths, needs, explain how best a child's performance can match his/her potential and implement an individual, effective learning program. With the student's help, the collection of data and the constant individualizing of the program, learning success is possible for anyone.

Barbara Bateman, Ph.D. and J.D., began her special education areer in the 1950s, in public schools and institutions where she taught children who had mental retardation, visual impairments, autism, speech and language disorders, dyslexia, and other disabilities. She conducted research focused on learning disabilities with Dr. Samuel Kirk and other renowned special educators at the University of Illinois. In the mid-60s, she returned to Oregon and taught special education and special education law

courses for 34 years at the University of Oregon and during that time graduated from the University of Oregon School of Law. Since the mid-70s, she has stodd with one foot each in law and special education, serving as an IDEA hearing officer and expert witness, conducting training in special education law for attorneys, graduate students, parents, and school district personnel; and consulting with attorneys, schools districts, and parents in special education legal disputes. Bateman is co-author (with M. A. Linden) of the book, *Better IEPs: How to Develop Legally Correct and Educationally Useful Programs,* available from Sopris-West publishers, http://www.sopris-west.com/.